THIS WEEK'S National Petroleum NEWS

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Indiana Petroleum Association, Hotel Lincoln, Indianapolis, Dec. 5, 6.

Nebraska Independent Oil Men's Association, Paxton Hotel, Omaha, Neb., Dec. 11, 12, 13.

National Oil Show, Sherman Hotel, Chicago, Jan. 19 to 25.

Wisconsin Petroleum Association, Hotel Pfister, Milwaukee, Jan. 28, 29.

Iowa Petroleum Association, Fort Des Moines Hotel, Des Moines, Ia., Feb. 12, 12.

Ohio Petroleum Marketers Association, Deshler-Wallick Hotel, Columbus, O., Feb. 19, 20, 21.

Michigan Oil Men's Association, Statler Hotel, Detroit, March 19, 20, 21.

American Association of Petroleum Geologists, Roosevelt Hotel, New Orleans, La., March 20, 21 and 22.

NATIONAL PETROLEUM NEWS

Vol. 21 No. 49

Published by

The National Petroleum Publishing Co.
1213 W. Third St., Cleveland, O.

Tel. CHerry 7672

Branch Offices:

Tulsa, 904 World Bldg., Tel. 3-7132.

New York, 342 Madison Ave., Tel. Vanderbilt 3951.

Houston, 2020 Gulf Bldg., Tel. Fairfax 6286.

Chicago, 35 E. Wacker Drive, Tel. State 4141.

Subscription rate $3.50 per year, U. S., Mexico and Canada; $5 Foreign countries. Current copies 10 cents; for back issues more than two months old 25 cents per copy.

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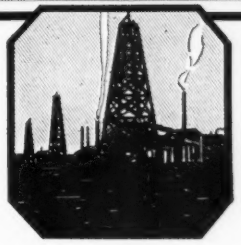
—Underwood & Underwood

SIR HENRI DETERDING, managing director of the Royal Dutch Shell companies, the guest of honor and one of the principal speakers at the annual meeting of the American Petroleum Institute at Chicago. American oil men were particularly interested in his address on "Common Sense in the Oil Industry," which came at a time when our industry is seeking such an application in planning its next year's business.

Sir Henri has risen from an obscure seller of kerosene in the Orient to the head of a billion-dollar organization with world-wide interests. His genius has been largely responsible for the phenomenal growth of the Dutch Shell group.

NATIONAL PETROLEUM NEWS

Published at
1213 W. Third St.
Cleveland



Branch Offices
Tulsa, New York, Houston, Chicago

Vol. 21 **CLEVELAND, December 4** **No. 49**

Subordinate Vanity for Sound Business Deterding Tells Oil Men

(By Telegraph)
CHICAGO, Dec. 3

VANITY of large producers and marketers must be subordinated in the interests of real conservation of the world's petroleum supply, Sir Henri W. A. Deterding, general managing director of the Royal Dutch-Shell interests, told leaders of the petroleum industry in America at the first general session of the American Petroleum Institute Dec. 3.

The large producers and marketers must aim at continually sound business rather than at being a big oil man temporarily, Sir Henri said.

The head of the British-Dutch Oil group, the largest competitor of the American oil companies, brought out six essential points on what should be done for the best interests of our industry in his address entitled "Common Sense in the Oil Industry."

Unit development of oil fields was approved in principle by the Institute directors at their meeting Dec. 3, and a resolution was adopted appointing a committee to cooperate with other organizations working for the adoption of this method of the orderly development of oil production. There was considerable discussion, some of the directors urging that the Institute should take a more active part in bringing this method of oil field development into general use.

The board also drew up a statement to present, on behalf of the Institute, at the general industrial conference of the Chamber of Commerce of the United States with President Hoover in Washington Dec. 5, on the present situation in the oil industry and the outlook for 1930. Capt. J. F. Lucey, of the Lucey Petroleum Co., is to take the statement to Washington.

The statement, which is short, discusses generally the situation with regard to crude supply, pointing out that voluntary proration efforts will probably work to hold back over-production in 1930.

The key to the prosperity of the oil industry in 1930 was stated to lie in the holding back on the part of the refiners from an over-production of gasoline, such as has taken place in 1929. No figures were given as to extent of the gasoline over-production this year and no suggestions were given as to any effort by the industry to prevent such an occurrence in the coming year.

REPORTS on other papers presented before the American Petroleum Institute in Chicago this week are published in this issue of NATIONAL PETROLEUM NEWS, beginning on page 33.

Discussion of the code of marketing practices and other marketing problems has been put over until Dec. 4, when they will also come up in general group meetings on marketing.

It is understood that representatives of the smaller local marketing companies have come to Chicago prepared to make an issue on what they claim is the practice of the large companies in making lease and license agreements with curb pump dealers and dealers having stations on land they do not own.

The Independents claim that gallonage, in as small amounts as 500 gallons a month, is being tied up on long term agreements by some of the larger companies, which makes the dealer an agent of the oil company.

At its meeting Monday the board accepted the resignations of E. L. Doheny, formerly the head of the Pan American interests, and also of H. M. Storey, vice president of the Standard Oil Co. of California, and passed a resolution of regret at the death of David S. Ewing, well known Independent operator in California.

W. M. Keck, of the Superior Oil Co., Los Angeles, was elected to fill the unexpired term of Mr. Ewing. Oscar Sutro, of the Standard of California, was elected to fill the unexpired term of Mr. Storey, and C. M. Fuller, president of the Richfield Oil Co., to take the place made vacant by Mr. Doheny's resignation.

The plan proposed at the Institute meeting a year ago to divide the activities of the Institute into three branches, producing, refining and marketing, with a vice president in charge of each, was discussed again at the board meeting Monday, and probably definite action will be taken upon it before this meeting closes. If it is adopted, the various Institute programs will be rearranged according to these three divisions, thus allowing closer administrative control of the work.

A start in this direction was made a year ago when three vice presidents of the Institute were elected, one for each branch of the industry. J. Howard Pew, president of the Sun Oil Co., Philadelphia, was made vice president in charge of manufacturing; K. R. Kingsbury, Standard Oil Co. of California, vice president in charge of production; and Henry M. Dawes, Pure Oil Co., vice president for marketing.

Text of Address by Sir Henri Deterding

(Presented before American Petroleum Institute, Chicago, Dec. 3)

(By Telegraph)

I SHOULD like you to consider what is the outlook today in the petroleum trade.

Although common sense would lead us during a time of threatened or actual overproduction to expend our time and money (even vast sums of money) in creating for the benefit of ourselves, and certainly also of mankind in general, new outlets for oil, we are forced instead by strenuous competition to produce oil in excess of the world's needs. And to concentrate at any rate so far as the big companies are concerned, upon creating duplications of facilities and wasting our energy, and to a large extent our cash, in creating such duplications, in spite of the fact that such duplications cannot create one single ounce of additional consumption.

Too many of the new-comers in the industry (unfortunately for a great part consisting of governmental bodies) think that we are still living in those comparatively "easy" times when "big" money in the oil industry was made in distributing the products, and the individual driller-producer and the bigger well-owner producer was left to get as much for his oil as the distributor would allow him.

Times have changed and, what is better, fundamentally changed. True, there are still those who think that such times may come back again, but beyond the end of summer time, when we put our clocks back one hour only, is there, especially in the oil industry, any chance of setting the clock back?

On the contrary, we have to go ahead faster than ever if we do not want to be left behind in the race for perfection, and what may appear as perfection today is going to give place to a very much higher standard in a few years to come.

We are living in the age of cooperation, and not only as the man in the street thinks of it, that is, in terms of cooperative stores, but in the sense of a very much higher set cooperative aim based on the fact that all industries are becoming visibly (as they always have been logically but too silently) interdependent.

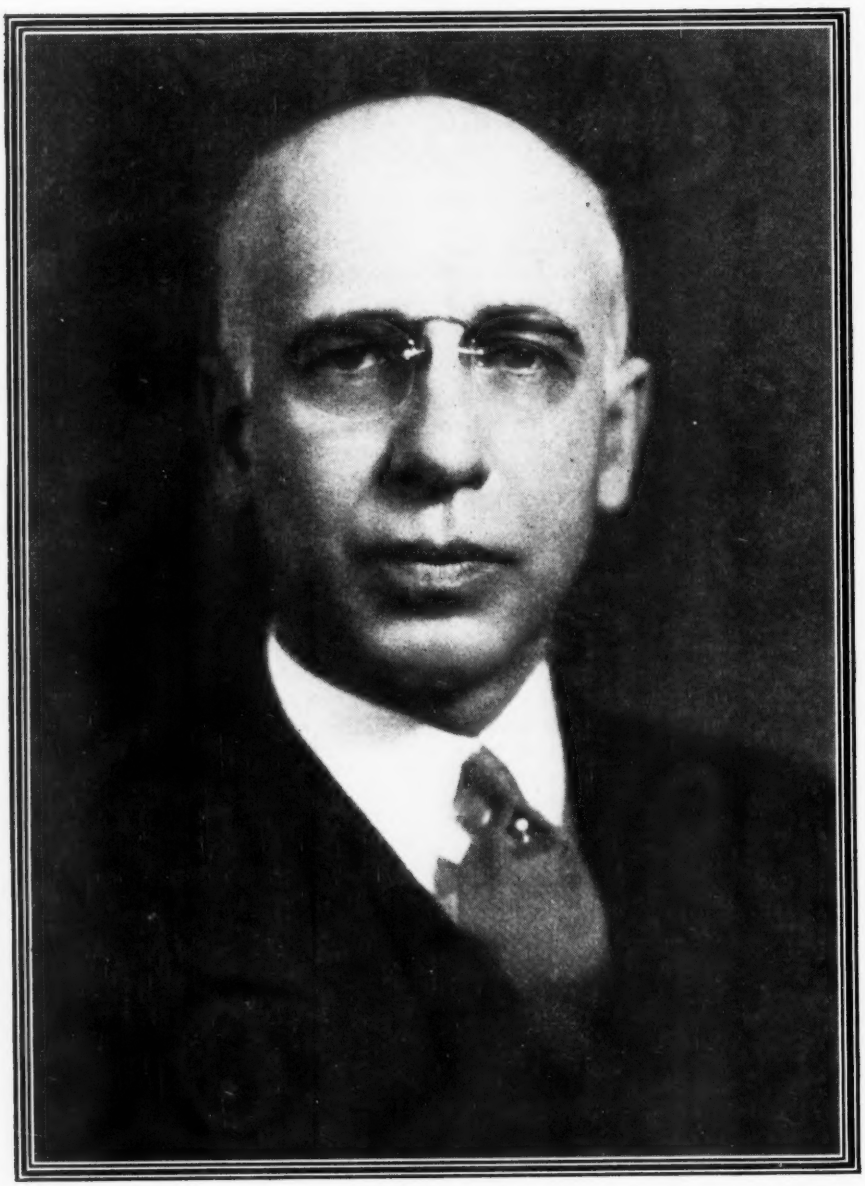
In this way the oil producer very quickly is becoming the "producing department," the oil refiner the "refining department," the pipelines, shipping, receiving installations and even the ocean-going fleets themselves representing the "forwarding department." These departments, which may be termed the "spending department," will be fed by the "collecting department" or the department supplying the public.

The idea that it might be possible that this "collecting department" could be some government, or combination of buyers, who will dictate to the producer the minimum with which he ought to be content so that he may keep alive, is bound to be short-lived because it is entirely illogical. Apart from the fact that producers in the different countries are by no means agreed, and never will be, as to how much is needed for living, the whole idea is the opposite of common sense at the present time, quite apart from the fact that unless the producer is well-fed he will not and cannot extend his operations.

It is just this extension that the ever-increasing number of consumers require, as the consumer's chief concern is that the producer should give him security of supply so that he also may expand on a sound basis, being sure of larger supplies when he requires them.

A poorly fed cow will not keep an increasing family well supplied with good milk.

I said above that we are allowing ourselves to have our energies and capital drained by duplicating facili-



Henry M. Dawes, president of the Pure Oil Co., vice-president of the institute on distribution, to preside at the session on marketing at the Chicago meeting

ties. In this respect too many of us look entirely at distributing facilities. I do not blame anyone for this, because it is the most apparent; but too many refineries, too many pipelines, etc., belong to the same family of wasteful expenditure. And of course when there is over-production at the bottom, too much is piped, too much refined; yes, and even too much shipped. Or do you think that in times of comparatively high tank-steamer freights, it is not wasteful to transport crude oil from one place to another without increasing its chances of entering into consumption in some form or other?

This is not academical, but let your imagination dwell for a few moments on the amount of at least $100,000,000 which have been wasted in such duplications in Mexico.

During 1920 to 1924, 18 ten-inch and 14 eight-inch pipelines were laid with a transport capacity to Tampico of 1,085,000 barrels of oil per day, because in those years there happened to be a daily production of some 400,000 barrels. Today there are only 98,000 barrels daily production in that district. I do not think I am exaggerating in saying that Mexico's oil producers, taken as a whole, have to carry the burden of a couple of hundred millions of dollars of capital expenditure on piping and refining with the present daily production of less than 100,000 barrels refinable crude (light) in that district.

I do not intend to blame anybody, myself included, for that expenditure, (cooperation was banned in those days) but I put this question: "What good did it do to the oil producers, to the consumers, or to that great country of Mexico?"

If that wasteful expenditure had been used (instead of as it is now on scrap iron) in the development of roads or for agricultural development, do you not think that even from the oil consumption point of view we should have been far better off?

My desire is to show by this illustration that lack of cooperation is really against everybody's interests, including the consumer, and still there are countries where the opinion prevails that cooperation should be avoided at any cost as being contrary to the interests of the common weal.

For the same reason, in some countries oil-producing land is still split up into small plots which is undoubtedly the most wasteful of all methods of producing. This is where the waste begins, and it is impossible to calculate the almost unlimited consequences of this waste on the far future. It is really a crime against civilization.

It is still not superfluous to quote an equally striking example of waste. When in old Austria in 1909 the production rose as compared with 1906 from 760,000 tons to 2,050,000 tons, refineries were born like babies. A protective import duty of $16.50 per ton of crude and refined had helped greatly to create this mushroom growth. How can the present day production of that district of less than 700,000 tons per annum support that old-time expenditure?

Today we see that gradually the producers there are trying to unite in bigger units, but never can the waste in the past be made good, as it is more than doubtful whether the production can ever again become what it was in 1909.

Now to return to our "moutons" as the French say. What can we do to avoid such Mexican and Galician disasters here?

Of course they can never be of that magnitude here with so many oil fields scattered in a country to be compared with a united Europe, and not landlocked as old Galicia is. Still, has it been a blessing to more than a few that Pennsylvania sold its large quantities of the world's best oil before there was the demand for its super qualities?

It took time, and a long time, to create that demand for its cylinder stocks. If it could have supplied at fair prices all demands (and it could not by a long way) all the improved and sometimes costly machinery to make as good oil from other crudes would not have come about so rapidly. The price would not have varied from $1.20 to $6.25 per barrel, and good Pennsylvania oil stock, capable of producing highly valuable products, would not have gone into fuel oil.

Please do not misunderstand this as a criticism on the past. If it were it would come under the heading "Judging events in the light of past experience." But I only quote it in

—*Underwood & Underwood*

W. R. Boyd, Jr., executive vice-president of the American Petroleum Institute, head of its staff at New York, and in general charge of its activities

order that we may now benefit by this experience. In other words "preserve your wealth for the time when it will be wanted, and do not waste it when it runs too freely."

Too many of us in the past, and even a great many today, think the oil supplies inexhaustible and we pay far too little attention to wasteful exploitation (apart from producing too much), forgetting that new fields in the states may still be "discovered" but they can never be "created."

Nature put them there in a limited number and it is almost childish to state that the more that are discovered the fewer that are left to the fate of discovery. Still, happy go lucky, so many people conveniently forget this axiom, whilst ready to "howl in the chorus," no doubt, if the day of reckoning should come in their lifetime, or to turn, unknown to those living then, in their coffins should it come after.

But although too many democracies are ruled with the idea "apres nous le deluge" we oil men, representing large companies which will live, if not forever, certainly longer than such selfish demagogues, have to keep the possible nearness of such events well in mind.

Our duty is not only to our shareholders, it is also the protection of the consumer, and I must raise my voice of warning that it is a bad day when the consumer is made to believe in everlasting low prices, and then later by a temporary scarcity has to face higher prices. There is no need for this event. Wise conservation, which is "practical conservation," is wanted by shareholder, producer and the consuming public alike.

Do not be led away by the noise of publications about trusts. Some publications can only exist by making cheap noises. If we do what we honestly believe is our duty to the public, nothing ought to stop us from doing that duty. It is a happy man who is never reproached by his conscience.

There are wise men of distinction who have been saying, publishing more than once, "Are the U. S. going on producing all they can, more than they can consume, with the result that they are exporting today at a low price what they are likely to be importing later on at a higher price? Are they going on overproducing today when they may be overconsuming in a few years?"

The point has not been put which is in many minds outside the states: "Are we (the public outside the U. S.) going to rely on supplies from the States when these may be less at some approaching time, seeing that no thought is given to conservation? Must we (non-Americans) not strain every effort, however costly, to protect ourselves for our future consuming needs, seeing that continuation of exports from America is simply looked upon as temporary dumping of excess production?"

That, of late years, American producers have taken an interest, and more than a passing one, in foreign producing fields is really the outcome of the sound view that the world should not be entirely dependent on one country for supply. But then, why not go a step further on this international way and preserve the supply of your own country for the time when you do not want to export it, but can realize for it the price which it would cost others to bring it to its destination in the States? But all this is not "the goods" for the delivery of which we have come here today, namely, the question: "What is to be done? What is the best thing to do for the industry as a whole?"

Well, first of all conservation. Let us gradually, practically, and scientifically realize that we have, and how we can draw on it liberally, not only now but in the future, that is, if we come to the conclusion that we can continue to export the excess over consumption to see in how far such excess is going to be lasting.

Secondly, let us rather lay ourselves out to produce the best, and to spend on this the money which we should otherwise waste in duplication of facilities for distribution only. The best goods can afford to laugh at inferior goods, even in spite of superior distribution.

Thirdly, let us always bear well in mind that production, once created in a foreign country, has to be sold there, and that over-production in and exporting from the states in order to stop such sale is the contrary of common sense. The consequence of such action is simply, in the long run, pulling down your own market against yourself to the full extent of your production.

Fourthly, let us always realize that production in a country is going to be sold in that country, whatever the price may be, and that logical government protection against cheap dumped imports is a certain event. True in Mexico the reverse has been the case, but then unfortunately a past communist tendency was more bent on creating taxation burdens than bettering the internal condition of the country.

Fifthly, let us remember that excess of facilities must in the end raise the price of sale against the consumer on account of the large capital expenditure for our facilities, whilst the producer is charged with the odium of such high prices without having the benefit thereof.

Sixthly, and lastly, let us realize that where there are several dozens of large producers and marketers, and joint action is necessary, we must sink vanity and aim at continually sound business rather than at temporarily being a big oil man with its big burdens and responsibilities.

I am simply stating a fact when I assert that when in 1902 the Dutch Indian producers joined hands, coupled with the wisdom of the policy of the Dutch government not to issue small or "split up" concessions, it was the birthday of the greatest Dutch colonial enterprise, and when, later, the Burmah and Anglo-Persian companies cooperated in distribution, every company gained, not only the greater assurance of supplies to the clients dependent on them, but the certainty of their own bright future.

In short, my advice (in which practice I am 100 per cent partisan and cooperator) is "Let us create an 'Association of cooperation' on the basis of possibility of permanent production with the assistance of such distributing organizations as are willing to cooperate, and do not let us worry about those who will not do so."

A. P. I. to Survey Tank Fires Each 5 Years

CHICAGO, Dec. 2.—The general committee on fire prevention of the American Petroleum Institute decided today to inquire into the frequency rate of oil tank fires at five-year periods and to ascertain whether casualties resulting from tank fires are on the property of the tank owners or on adjacent property. The information so gathered will be used in determining reasonable insurance rates, and whether oil storage plants are hazardous to nearby property.

Recommendations for fire protection means may also follow the five-year surveys.

The committee will also make a survey of fire prevention methods in use in the industry. This survey will will be made by means of questionnaires, with particular emphasis on the use of dry powder foam and the systems for applying it. Questions also will be asked with regard to carbon dioxide prevention systems.

The committee also voted to call the attention of the National Fire Protection Association to the fact that its recommended ordinance governing the storage of flammable liquids are not being generally adopted by regulatory districts and some unreasonable ordinances are being enacted by some communities.

A special committee of the general committee will consider reorganization of the general committee with the view of getting more activity and cooperation into the fire prevention work. The special committee will be appointed later in the year by the A.P.I. headquarters in New York.

D. V. Stroop of the institute's technology staff was chairman of the meeting.

Institute's Work Vital to Daily Life Of Every Oil Company

CHICAGO

"WITTINGLY or otherwise, the work of the American Petroleum Institute in most respects affects the balance sheet and the every-day business life of every company engaged in the petroleum business."

E. B. Reeser, president of the Barnsdall Oil Corp., made this statement in his address as president of the institute at the opening session of its convention here Dec. 3.

"The institute is the instrumentality through which the larger petroleum industry policies are formulated; through which industrial standards are fashioned. These policies affect directly an invested capital of around $11,000,000,000."

President Reeser devoted his remarks to outlining the various activities on behalf of the oil industry in which the institute is engaged.

In describing its statistical work he stated that the most notable single piece of information issued is its newly inaugurated refinery report. "Companies representing more than 95 per cent of the daily operating capacity of the entire refining branch of the industry are contributing their figures and cooperating in making this report a success," he stated. "It is expected that the few companies not now sending their figures will soon conclude to report them, thus making the published figures cover 100 per cent of the refinery capacity of the country."

Concerning the work on developing a uniform method of oil accounting, Mr. Reeser said that, during the past year, a committee of oil company comptrollers and accountants have been going over the charts and work sheets which have been produced as a result of the work; and that a final report with all revisions was to be issued to the institute directors for approval at this institute meeting.

In connection with its work on railroad transportation problems arising in the moving on the rails of the 150,000 tank cars of the industry, it was brought out that the institute represents the oil industry at all hearings of any kind incident to rail transportation, except freight rate cases. An active committee of oil company traffic and transportation experts functions regularly.

E. B. Reeser, president of the Barnsdall Corp., who, as president of the American Petroleum Institute for the past year, guided its destinies through a turbulent year for our industry

In discussing the fire prevention work of the institute, President Reeser stated that the compilation of the fire records of the oil industry, instituted in 1926, is being continued and is rapidly becoming a substantially complete record of oil property fires.

"Such a record is invaluable in combating unnecessarily restrictive legislation with regard to the storage and handling of our products," said Mr. Reeser. "I urge a voluntary report to the institute of all fires as soon as practicable after their occurrence. A standard fire report form, prepared for the purpose, will be furnished oil companies on request."

In a survey of the pollution of water by oil, 619 oil plants and 177 oil fields were inspected by voluntary representatives of the Institute, it was brought out in the president's address. This survey was made by voluntary representatives of the In-

stitute. The data resulting from these inspections have been published by the Institute.

A general committee of oil company technologists handles problems on general refinery technology coming before the Institute, said Mr. Reeser, and develops the program on refinery technology for the annual meetings. "This committee feels that the best interests of oil company refinery technologists would be advanced by the formation within the institute of a division of refinery technology."

In cooperation with the National Automobile Chamber of Commerce and the Society of Automotive Engineers, the Institute is carrying on a research program in motor fuel at the Bureau of Standards laboratory at Washington which this year consisted mostly of a study of volatility in its relation to starting and acceleration and an effort to bring about a standardized method of determining anti-knock ratings for motor fuel.

In its general study of corrosion problems the Institute maintains a research associate at the Bureau of Standards whose work has been of assistance to oil companies operating pipe lines where the soil is corrosive by nature.

A general committee on automotive transportation has cooperated with the Committee on Flammable Liquids of the National Fire Protection Association in the preparation of a good practice statement for the construction and operation of gasoline tank trucks.

As a part of the fundamental research program made possible through contributions of $50,000 per year for five years by John D. Rockefeller, Sr., and the Universal Oil Products Co., 71 research papers have been published or approved for publication up to the present.

President Reeser stated that, in the standardization of oil country material program, now centered mostly on the introduction of standardized equipment into general use in the fields, over 12,000 field posters have been distributed in oil field camps. The posters contain condensed rules of good field practice.

"The executives and management men of the industry still do not take as active an interest as they might in directing the introduction and use of A.P.I. standards and codes," said Mr. Reeser. "I strongly urge all the officers and department managers of every company to support this constructive work and direct the use of A.P.I. standardized material.

"Many companies have already issued mandatory orders requiring the use of these standards and codes. The executive, with the authority at his command, can easily reap the benefit for his company from these standards and codes by requiring their use on his properties."

In discussing the code of marketing practices, Mr. Reeser said that over 4000 oil companies have notified the Federal Trade Commission of their acceptance of the code without reservation, and that 800 members of newly formed code committees are working for its general acceptance throughout the industry.

"No one can rightly challenge the motive of this code" said President Reeser. "Its sole purpose is to correct evil practices and assist in the stabilization of the marketing branch of our industry. It is not designed to aid one marketer at the expense of another. Good business men will accept and follow it because it is a step in the right direction."

Discount to Salesmen's Cars Being Dropped

CLEVELAND, Dec. 2.

MANY of the larger oil marketing companies are refusing to allow commercial discounts on salesmen's and other passenger cars on business done through the service station, according to recent reports by their sales executives to NATIONAL PETROLEUM NEWS.

Other companies are awaiting further discussion on the subject of commercial discounts at the American Petroleum Institute meeting at Chicago this week before announcing their policy in the matter.

The Magnolia Petroleum Co. Nov. 1 discontinued allowing the discount off the service station price on salesmen's cars throughout its territory, according to E. P. Angus, general sales manager. "This company has accepted the Code of Ethics as of Nov. 1, 1929," stated Mr. Angus. "Discounts under contract or otherwise, prior to Nov. 1, that did not meet with the code definition of commercial accounts have been discontinued."

The Gulf Refining Co. is not allowing the commercial discount on salesmen's cars except where the company is under contract and it is not now closing any commercial contracts in which the price is extended to salesmen's cars, according to M. V. Hartmann, vice president.

Mr. Hartmann stated the company was endeavoring to have its dealers follow the same policy.

The Sun Oil Co. has discontinued allowing the commercial discount to any cars other than those carrying commercial licenses, according to S. B. Eckert, vice president. He said that the company would not insist that its dealers change over to this policy until the question had been discussed at the institute meeting.

"In territories where commercial discounts off service station prices are in vogue, it is our rule that they be allowed at our service stations to charge accounts only for gasoline requirements of trucks and buses. We do not allow a discount on any passenger car," stated A. H. White, vice president of the Indian Refining Co. He stated he believes most of the company's dealers follow the same policy.

The Standard Oil Co. of Indiana announced, through Amos Ball, general manager, that all sales through its service stations are on one basis regardless as to whether or not the sale is made to a commercial account or pleasure car, the basis being market price at the station at date of delivery, regardless of quantity purchased.

The Standard Oil Co. of New Jersey does not allow commercial discounts on salesmen's cars, or on any passenger cars unless they carry commercial licenses and would come under the provisions of the code. "We encourage all dealers to sign the code and be guided by its provisions," stated C. G. Sheffield, vice president.

The Standard Oil Co. of Louisiana announced, through T. H. Taylor, sales manager, that it was handling commercial discounts through service stations in accordance with the code of ethics.

Daily Average Crude Output Drops in October

WASHINGTON, D. C., Dec. 2.—Daily average crude production in October was lower than that of September, while the monthly total was up 835,000 barrels, so the Bureau of Mines reports for October operations. October production was 88,104,000 barrels.

Crude stocks east of California dropped 2,160,000 barrels in October. Stocks in California were up 2,674,000 barrels.

Gasoline stocks gained 1,820,000 barrels in October, kerosene and gas and fuel oil stocks were unchanged. Lubricant stocks were up 432,000 barrels, and wax stocks gained 5,380,000 pounds.

Fair Increase in Gasoline Demand Is Expected Next Year

By Roger B. Stafford
N. P. N. STAFF WRITER

CLEVELAND, Dec. 2

OPINION has been pretty general among executives of large oil companies that demand for gasoline in 1930 will be considerably larger than 1929 demand but that the rate of increase will be less than the rate of increase of demand in 1929 over 1928 demand.

The Bureau of mines report on refinery operations in the first nine months of 1929 showed an increase of 14.4 per cent in the shipments of gasoline from refineries to domestic distributors or consumers over shipments in the like period of 1928, a larger rate than has obtained the last few years.

The increase in gasoline used in motor vehicles on public highways has not increased so fast as total demand in the United States, the U. S. Bureau of Public Roads showing only an 11.6 per cent gain in its compilation of gallonage as revealed by gasoline taxes paid in the first half of 1929.

But the Atlantic Refining Co. expects the growth in gasoline gallonage in 1930 to be slightly above the rate of gain which it calls "normal expectancy," a rate that experience has shown to represent normal growth of gasoline consumption.

W. M. Irish, president of the Atlantic, gave NATIONAL PETROLEUM NEWS this view concerning demand for the major petroleum products and crude oil in 1930:

"Our opinion is that domestic gasoline demand will be about 404,000,000 barrels, which is 4,000,000 barrels higher than normal expectation but only 8 per cent greater than demand during 1929. Exports, at 66,000,000 barrels, will be slightly above normal expectation and about 10 per cent higher than during 1929.

"Crude requirements will be set, as in the recent past, by the demand for gasoline. About 1,048,000,000 barrels of crude will be run to stills, equal to an increase of 6.5 per cent over 1929's runs; 30,000,000 barrels will be used without processing. Total crude requirements during 1930 will approximate closely the combined domestic production and imports during 1929, and exceed requirements in the earlier year by a little more than 6 per cent.

"Domestic demand for kerosene will vary but little from that during 1929. Exports may suffer further shrinkage.

"Domestic demand for fuel oils and lubricants is expected to decline in the early months of 1930 from the high levels set during 1929, and to experience substantial recovery following the mid-year."

W. T. Holliday, president of the Standard Oil Co. of Ohio, believes that a slackening of industrial activity and of sales of new automobiles will cause a slowing down in the rate of increase of gasoline consumption. Mr. Holliday expressed his views of the outlook for our industry in 1930 and his opinion about the recent inflation of oil stock prices as follows:

"We feel that the outlook for the oil industry generally will depend primarily on the extent to which production of crude oil and of gasoline is kept in balance with consumption requirements.

"We do not anticipate that the gain in gasoline consumption in 1930 will be as great as in 1929—partly because the recession in business may affect consumption slightly, but mainly because consumption in 1929 received an extraordinary stimulus from the tremendous number of new cars which were sold this year. It does not seem likely that the production of new cars will be as great in 1930."

"PETROLEUM products used for industrial purposes will, we believe, encounter some falling off in demand, owing to the probable lower rate of industrial activity - - - at least during the first part of 1930.

R. R. Irwin, president of the White Eagle Oil & Refining Co., foresees as profitable a year in 1930 as in 1929 because our industry is learning of the possibilities of reasonable cooperation. Mr. Irwin had this to say in regard to the oil industry outlook and the stock market deflation:

"I consider the outlook for the oil industry in 1930 very good. and I anticipate a year equal to 1929 in profits. The industry is learning from month to month the possibilities of reasonable cooperative efforts for conservation of crude oil production.

"Selfishness on the part of some companies, both large and small, will cause upsets in some of these conservation plans from time to time but on the whole the knowledge of benefits to be gained will cause this type of movement to become more and more permanent. Part of the benefits of a better balance between supply and demand will be counteracted by some unwise marketing and expansion ideas that are being indulged in by some companies.

"I do not expect gasoline demand to increase next year in as large a percentage as it has this year. This is based on an estimate of less cars being purchased the latter part of this year. I expect some increase in gasoline consumption next year—say, 5 or 6 per cent.

"I DO not anticipate domestic consumption of other products to increase materially, with the exception of road oil. Some new specifications and new methods of application afford a potential market for road oil of surprising size."

"As to the outlook for the oil industry in 1930," said E. W. Sinclair, president of the Sinclair Consolidated Oil Corp., "we have given this subject much thought since the upheaval in the stock market. We have come to the conclusion that 1930 will be a normal year in business, and if so the oil industry can look for a year of considerable prosperity and that it will bring with it some increase in the demand for gasoline and other products.

"I can say with some definiteness that the prices received for manufactured products are unwarranted, as they are entirely too low."

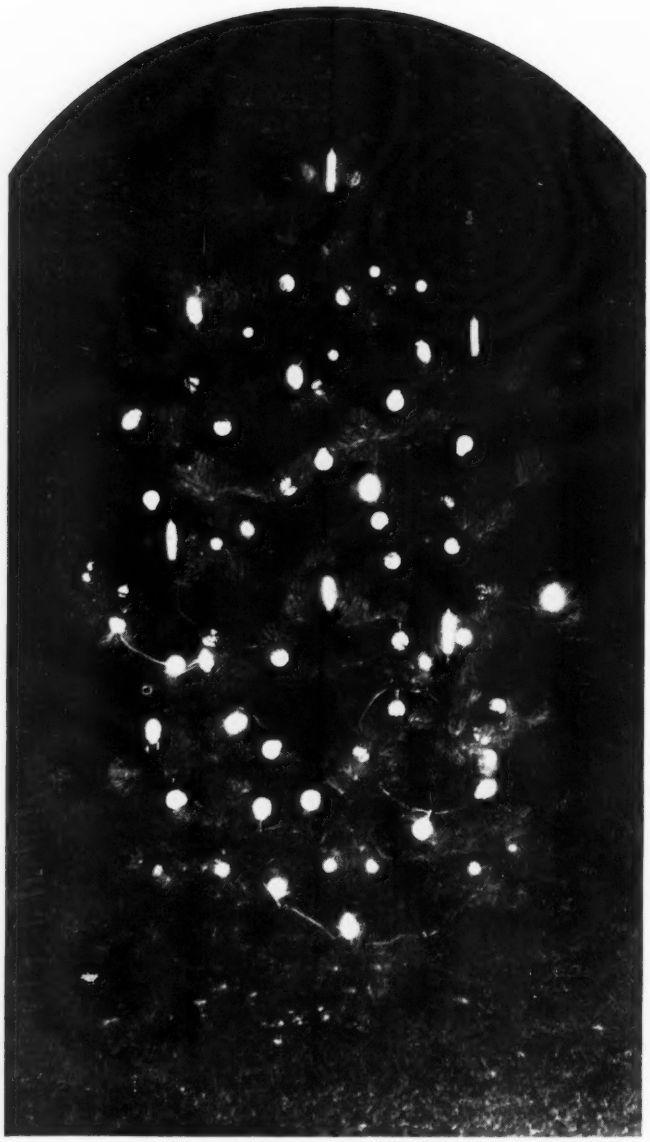
That our industry is in step with the effort of President Hoover to maintain prosperity is evidenced by further oil company announcements of 1930 building programs.

The Standard of Ohio has appropriated $2,750,000 for construction in 1930. Sinclair has no special program, Mr. Sinclair said, but would continue to keep pace with the industry.

The Humble Oil & Refining Co., said W. S. Farish, its president, plans a normal construction program "which means improvements at refineries, drilling, necessary pipe line and tankage construction to handle the business."

Humble's 1930 construction budget is approximately the same as its 1929 budget, Mr. Farish added.

Helping Welcome Old Santa



A large Christmas tree decorated with shaped lamps

By E. L. Barringer
N. P. N. STAFF WRITER

CLEVELAND

CHRISTMAS just around the corner offers station operators an opportunity to join with other retail distributors in decorating for the holiday season.

By concentrating Christmas decorations at a few select stations an impressive display can be made. Retail outlets of many oil companies are far flung, and to decorate all stations would necessitate a sizable financial outlay, and the results would not be impressive.

Fred C. Cramer, at Denver, has been decorating one of his main stations for several years. His company, the Denver Powerine Co., calls in a commercial decorator to work out a display. The other company stations benefit from the decorations as the attendants invite patrons to visit the display at the main station. A chain of stations using this idea might place placards at outlying units inviting the public to the main station display, direct mail pieces might be used to advertise the Christmas decorations, and several newspaper advertisements might be used to give publicity to the effort.

For decorative purposes the service station has many advantages over other types of retail outlets. The majority of stations are in residential shopping centers, away from the concentrated retail districts where stores have elaborate and costly Christmas decorations. In these concentrated districts the displays are of necessity costly to compete for the attention of the shopper, and the service station avoids this expensive competition.

Service station locations are sought, and laid out, for good visibility from the standpoint of the passing motorist. Consequently Christmas decorations have greater visibility, as compared with decorative efforts at grocery stores, meat markets and other stores in residential communities where the windows are flush with the sidewalks. Canopies, air and water standards, sign posts, and floodlights can be used for attaching Christmas decorations. These pieces of standard equipment can carry the decorations, and the station operator does not have to erect temporary poles or frames.

The station operator has another advantage as his place of business is open when other stores in the community are closed. His display is at its best in the evening when people are on the street in holiday spirit and in a mood to comment on the "corner gas station's" Christmas garb.

Simple types of Christmas displays may be made quite attractive, although the elaborate set-up probably attracts more attention. An outlay of a few dollars would buy a Christmas tree and several strings of lights. A display covering the entire station grounds obviously is more expensive, especially if some of the built-up materials, such as stars and other designs, are used. However, it should be remembered that the original outlay for the elaborate display includes materials that may be used over and over again.

An important consideration in planning Christmas decorations is the fire hazard. Materials that have the least fire hazard should be used. It would be advisable to keep decorations off the pump islands, and not to use the pumps for attaching festoons. Electric light bulbs should not be placed where vapors might collect, as a broken bulb might cause a flash. Flammable tinsel, crepe paper, and similar materials should be avoided.

At the end of this article details are given for decorating a station illustrated herewith. These word pictures are given to show the possibilities of service station decoration in a simple display or one more elaborate.

Materials available for station decorations follow. Any of these materials could be used alone, or could be combined with others, depending on the amount of money an operator would care to spend. Assistance in

planning displays might be obtained from local florists, or an employee with an artistic bent could use his talents.

Lamp festoonings is the least expensive and an attractive means of forming pleasing designs and of covering large areas. These can be draped over doorways, windows, gables, strung along the building, around canopies, down pillars, and across to or between light standards.

A string of electric light wires, with lamps at frequent spacings, covered with laurel or evergreen roping makes an attractive festoon. The cost of a festoon of standard sockets with 12-inch spacings would be about 55 cents a foot. For smooth appearance it is recommended that lamps be spaced on 12-inch centers. Spacings of 18 inches are satisfactory when the festoon is high, or for spanning streets.

Laurel or evergreen roping is recommended for covering up the barren appearance of wires in the daytime. Laurel roping is machine made, and is less expensive than evergreen roping which usually is hand-made. This roping may be tied or wired to the string of lamps at intervals. Many florists stock this roping for the holiday season. Ten or 25 watt colored lamps may be used on the standard socket strings.

Festoons of smaller lamps may be used effectively over windows and doorways, and when the viewing distance is short. The standard multiple Christmas tree strings of seven intermediate sockets may be joined together to form any desired length of festooning, or longer strings of intermediate sockets may be purchased especially for this purpose. The small 10 watt intermediate base colored lamps are used in these strings.

Red and green have been considered the standard Christmas colors. However, greater variety may be obtained through use of colors in the lamps. Golden festooning, using orange-amber lamps, is especially attractive.

Outline lighting often is effective for station buildings. Festoons may be used to form an outline, or sockets may be mounted on a light wooden or metal framework. An interesting effect is obtained by connecting the lights in two or three circuits to a flasher, so the lamps will twinkle or scintillate. A running effect would not be appropriate to the season.

Christmas trees may be placed on the grass plots around the station, around sign or floodlight standards, or on top of the canopy. Several manufacturers produce strings of lights for Christmas trees, seven lamps in multiple, so if one burns out the others remain lighted. These bulbs are somewhat larger than the small lamps of the eight-lamp series strings. The larger, standard base lamps, can be used on larger trees. New to the market this year are 25 watt lamps of a modernistic flame shape, Gothic shape, and candle shape. These lamps make attractive ornaments for the larger trees.

Electric lights may be used alone to decorate a tree, or metal tinsel and ornaments may be added. Only fireproof ornaments should be considered.

An inexpensive piece for outdoor decoration is a candle made of stove pipe. A single or several sections can be used, mounted on a wooden base, and painted white. Such a candle is topped with a 15 watt intermediate base or a 25 watt standard base flame-shaped lamp.

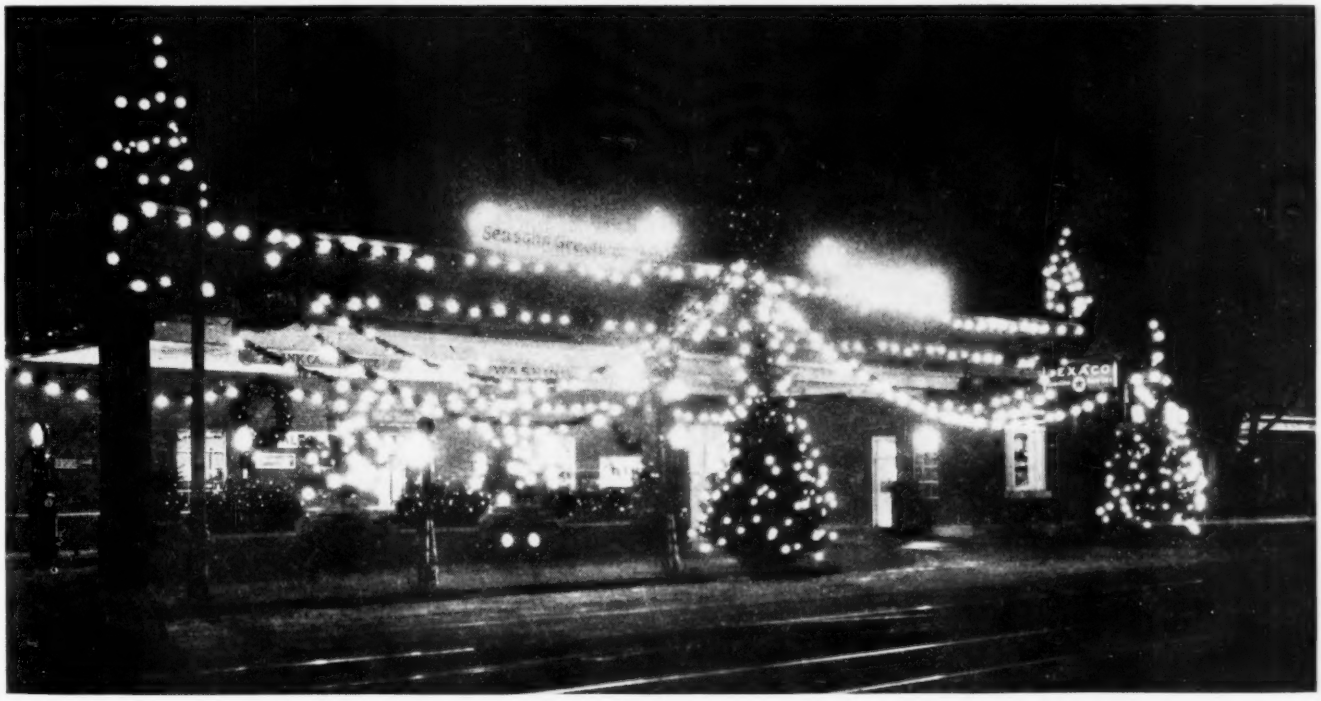
Designs cut out of, or painted on, composition board have many possibilities. Greetings, such as "Merry Christmas" can be cut out or lettered on. Other uses would be Christmas bell or star designs, pictorial scenes such as Santa Claus and his reindeers and religious scenes or illuminated houses.

Floodlights or reflectors may be used to illuminate the cut-out designs. If the standard floodlights are of sufficient strength these will light up the cut-outs. To help the lighting effects the cut-outs could be covered with metallic paints which catch the light; the light wooden supports top and bottom can be painted black so they will not appear.

The station floodlights can be used in the decorative plan. Gelatin slides, as used in theater spotlights, can be placed inside the glass cover door. It is necessary to keep water from the gelatin. The cost is about 25 or 30 cents for a sheet 20 by 24 inches. It would be advisable to have several extra sheets at the station for replacements. Any theatrical supply store would have gelatin sheets.

Most any color, excepting blue which has a low intensity, may be used in the floodlights. The lower intensity of colored lights is usually more than offset by the attention getting power of the colors, in case any operator is apprehensive about taking floodlights off the regular job of lighting up the station.

Built-up lamp studded pieces in the form of stars, and other shapes are



A one-stop station decorated for Santa Claus. Note the festooning, and location of Christmas trees

A Columbia Refining Co. station in East Cleveland, Ohio. A word picture on how this station could be decorated is given in the article

available this year. They may form the entire display, or may be used in conjunction with festooning, Christmas trees, and colored floodlights. The metal stars are available in several sizes from 19 to 50 inches in diameter. Other shapes are 14-inch diameter circles, 16-inch crescents, 18-inch diamonds and 18-inch spear heads. The lamp-studded shapes are rather expensive on the basis of use for a single display, but they can be used for many years and formed into many different decorative plans.

Similar shapes could be made of wooden or metal framework with lights attached.

There are standard materials on the market for use in decorating windows and doors. For windows there are candle wreaths, candelabra sets, candles, in addition to the shapes mentioned above.

Silhouettes in the form of stars, Christmas bells, or pictorial designs are effective in windows. If the interior light of the building is not strong enough, reflectors may be mounted inside the station, directed toward the windows.

In addition to the candle wreaths which are part of the standard line of Christmas decorative materials, it is possible to have the florist make up lamp-studded evergreen wreaths. These are especially attractive in conjunction with lamp festooning. A wreath of red ruscus makes an attractive piece. With a string of lights behind, the ruscus wreath takes on a warm, rich glow.

Another novel idea is the suggestion that a station install a loud speaker for playing Christmas carol records from a phonograph inside the building.

Any of the electric equipment mentioned can be purchased or ordered from an electrical shop.

The possibility of theft should not be overlooked in planning a display. These thefts may not amount to much, but it is annoying to find a few bulbs or strings of lamps or trees missing each morning. A night watchman may be employed to protect the more elaborate display, although his wage would usually amount to more than the value of the goods taken.

Christmas trees might be arranged in front of the station building so they could be taken in each night, or could be placed on top of the canopy. Festoons on the building or light standards could be placed high enough to make the thief go to some trouble to steal lamps.

The display should be darkened when the station is closed for the night. Late motorists seeing the lighted display might drive in, thinking there was all-night service, and to find the pumps locked might create ill-will.

While there is some commercial atmosphere in Christmas decorations at retail stores it is well to keep this aspect in the background. Christmas decorations should be a station's expression of good will to the public and not a means of advertising gasoline or motor oil.

It is recommended that decorations be in place and lighted at least a week before Christmas and removed after New Year.

As an example of the use of the decorative materials discussed above a word picture follows on how a station of the Columbia Refining Co., in East Cleveland, O., might be decorated. This station was picked at random, and the two displays, one simple and the other more elaborate, are two of many possible decorative schemes.

A photograph of this station is published with this article. Since this

Safety Hints in Station Christmas Decorating

Some safety hints in service station Christmas decorations have been given by Houston Dunn, secretary treasurer of the National Petroleum Mutual Fire Insurance Co., in a letter to NATIONAL PETROLEUM NEWS. A summary of these precautions follows:

Competent electricians should do the wiring. Avoid "home made" jobs.

Switches controlling electric displays should be sufficiently high to be out of danger of gas fumes lying near the ground or floor level.

Paper, tinsel, and other decorations of a light, flimsy character should be avoided in decorating. These materials ignite from a flash, and spread fire quickly.

Decorations should be confined to service stations, and not to bulk plants.

"We would not approve flimsy and inflammable decorations and would regard the introduction of these as possibly constituting a breach of the insurance contract without written permission from this office," wrote Mr. Dunn.

picture was taken some changes have been made; the two pits at the right have been enclosed in a sheet iron one story building, the light standard at the right has been replaced with floodlights, two lights on the pole with 300 watt bulbs, and directly in front of the station is a Pennzoil sign.

This sign is across the sidewalk, about three feet wide and two feet deep. It is on a pole with cross arms parallel with the sidewalk, these poles being about two feet on each side of the standard. At the street intersection is another floodlight standard, similar in location to the one at the right of the picture.

For a simple display Christmas trees would be placed on both sides of the station building door, festoons would be around the sign over the sidewalk, the floodlights would be covered with gelatin, and a wreath would be placed in the gable over the door.

The Christmas trees, one on each side of the door, would be about three feet high. Each tree would have two strings of seven multiple lamps, intermediate base.

The wreath over the door would be about 20 inches in diameter, and hung low enough from the point of the gable so it would not protrude over the sides of the gable. A boxwood wreath would cost about $8 or $10 in Cleveland. After the florist had made the wreath, lamps could be pulled through as desired so the wreath would be illuminated.

A lamp festoon, with 6-inch lamp centers, would be strung around the Pennzoil sign over the sidewalk. This would require about 16 feet of festoon. Over the side arms on the sign a festoon of 12-inch centers would be draped, requiring about six feet of material.

Colored gelatin could be placed over the four floodlights. The enclosed pits would not be used in the scheme, excepting that colored bulbs could be placed in the goosenecks over the entrance doors.

The cost of this simple decoration would be $45.70, figured at list prices in Cleveland. Of this amount $31.66 would be for permanent decorations, and $14.04 for temporary material. The festoons would be permanent, excepting that the laurel or evergreen roping would have to be renewed each year at a cost of about 7 cents a foot. This roping on the festoons, the wreath and the two Christmas trees would be temporary materials. Following are the detailed figures:

Two Christmas trees	$ 1.50
Four strings of Christmas tree lights	15.00
Twenty-two feet of festooning	18.20
Twenty-inch boxwood wreath	10.00
Gelatin sheets	1.00
Total	$45.70

For a more elaborate display four Christmas trees could be used in front of the station—a tree about 2½ feet high on each side of the door with trees about 3½ or 4 feet high at each corner of the building front. The smaller trees could have one string of lamps each, with two strings on each of the larger trees.

In the gable over the door a 30-inch star could hang. This star could be purchased, at a cost of about $25, or one could be made with sockets fastened on a wood or metal base. This star would be illuminated, and would hang entirely within the gable.

The sign standard over the sidewalk would be decorated as in the simpler scheme.

Two uses of festooning could be made for decorating the floodlight standards, each use requiring about 300 feet of 12-inch center festooning. One use would be to drape the 12-inch center festooning from the floodlight on the right, to the sign standard, to the floodlight on the left thence to the street light pole at the side of the station on the left.

Another use of festooning would be to drape it from each of the floodlights to the high gables on the building, then from each of the end gables to that over the door.

The gelatin could be used in the floodlights, as in the simpler scheme, and colored bulbs could be put in the goosenecks over the enclosed pits.

Costs on this more elaborate decoration would be about $244.20, at list prices, $208.16 for permanent and $27.04 for temporary. The festooning would be permanent, the roping renewed each year at about 7 cents a foot, and the star could be used again. Following are detailed cost figures:

Six strings of lights for trees	$ 22.50
Four Christmas trees	3.50
Gelatin sheets	1.00
Thirty-inch star	25.00
Three hundred feet 12-inch festooning	165.00
Twenty-two feet of 6-inch festooning	18.20
Total	$244.20

For the 12-inch festooning 25-watt A-19 bulbs or 10-watt S-14 bulbs could be used. In the six-inch festooning 25-watt bulbs would be used.

This station building was constructed of red brick with yellow stucco. Red and green lamps would be effective for the festooning and floodlights. A golden effect, from amber bulbs, would work out well also. One color of lights could be used throughout the decorations, or several colors could be used.

It will be noted that in these two decorations none was attached to the pumps, nor came near the pump island.

To prevent theft, the Christmas trees could be taken in each night. The festooning is above the ground. All lamps used in the decorations are in the open where vapors would not collect.

Light connections for the Christmas trees could be made through the station building windows, while the festoons could be reached from the sign standard.

H. L. Hughes Leaves Barnsdall

TULSA, Nov. 30.—Harry L. Hughes, for the past several years sales manager for the Barnsdall Refineries, Inc., has resigned, effective Dec. 1, according to an announcement made Nov. 30. A successor to Mr. Hughes has not been named. Mr. Hughes has stated that he will announce his future plans shortly after the first of the year.

American Petroleum Institute report on refinery operations in the United States for the week ended Nov. 30, compared with the week ended Nov. 23

Districts	Per Cent of Capacity Reporting	Daily Av. Crude Run to Stills Wk. Ended 11-30 (Barrels)	Daily Av. Crude Run to Stills Wk. Ended 11-23 (Barrels)	Per Cent of Reporting Capacity Operated Wk. Ended 11-30	Per Cent of Reporting Capacity Operated Wk. Ended 11-23	Stocks Reported in Thousands of Barrels: Gasoline Stocks Nov. 30	Gasoline Stocks Nov. 23	Gas & Fuel Oil Stocks Nov. 30	Gas & Fuel Oil Stocks Nov. 23
East Coast	100.0	488,300	499,300	80.0	82.4	4,641	4,605	8,537	8,760
Appalachian	90.7	84,400	81,900	72.6	74.3	997	876	828	782
Ind.-Ill.-Ky	98.6	294,600	306,900	83.0	86.7	4,461	4,252	3,936	3,915
Okla.-Kans.-Mo	88.0	291,300	286,800	71.6	69.7	2,753	2,634	3,846	3,943
Texas	90.3	525,500	558,100	75.0	78.9	5,545	5,627	14,114	14,645
La.-Ark	95.2	173,000	190,200	60.5	65.1	1,694	1,719	4,885	5,228
Rocky Mountain	92.9	59,000	61,000	42.7	43.9	1,851	1,803	1,000	992
California	99.3	623,700	664,900	70.0	74.6	14,196	14,289	109,311	109,171
Total U. S.	95.1	2,535,800	2,649,100	72.5	75.5	36,138	35,805	146,457	147,436
Texas (Gulf Coast)	99.4	414,600	440,100	79.2	83.6	4,635	4,724	10,903	11,255
La. (Gulf Coast)	100.0	122,300	132,800	68.9	74.8	1,476	1,506	4,141	4,292

Unitization Committee Report Adopted By Mid-Continent Association

TULSA, Nov. 30

ADOPTION and endorsement of the report of the Unitization Committee, appointed several weeks ago by President W. M. Davis, was action taken Nov. 26 by directors of the Mid-Continent Oil & Gas Association.

The committee consisted of 12 members, six land men and the rest lawyers. The report of the land men's section was discussed in NATIONAL PETROLEUM NEWS of Nov. 20. The report herewith published is the report of the whole committee. Attached to it, for the consideration of the directors, was the report of the land men's committee and several forms of contracts for the guidance of those who are studying the subject of unit development. These forms, because of their great length, are not published here.

The committee report is as follows:

"The committee's survey of the practice and possibilities of unification of acreage included not only an interchange of views and experiences within the committee membership, but a general examination into the progress made during the past year and of the terms and conditions of actual contracts and cases where "unitization," or unification, has been accomplished, and an investigation of the retarding influences and circumstances which have frustrated attempts to "unitize," or unify.

Terminology

"The land division having suggested that, as one method of explaining and promoting the practice, a handbook on unitization be prepared for general circulation, it may be advisable to agree upon and state the meaning of terms in common use as related to this subject. We do not find the words unitize and unitization in all the dictionaries, the nearest approach to them being the words unify and unification. But since the industry has already coined the quoted words and they seem to convey an accurate impression of what is intended we suggest that they be retained and used. Suggested definitions of these and of other words or terms employed in the present day practice are as follows:

"'*Unitize*' *and* '*Unitization*' are defined as the process by which divided interests in an oil and/or gas pool containing a number of tracts of land are converted into undivided interests in the entire area; where the owner of the oil or gas rights in an individual tract or tracts of land surrenders his exclusive ownership thereof in return for an assignment to him of an undivided interest in the oil and gas rights of the pool as a whole; the purpose being to develop and operate the area as one property or unit through the instrumentality of a common agent, trustee or committee and thus avoid unnecessary competitive drilling, waste of gas and duplication of effort and secure greater recovery of oil at less cost.

DIRECTORS of the American Petroleum Institute meeting at Chicago are to consider the accompanying study of unitization and recommend rules of practice which was adopted Nov. 9 by the directors of the Mid-Continent Oil & Gas Association at Tulsa. The report was drawn up after extended study of practical methods by land men and legal phases by attorneys for Mid-Continent oil companies.

"'*Co-operative Agreement*'. Signifies an arrangement falling short of complete unitization in that the interests remain in severalty and each owner may develop and operate his individual lease or tract but providing for a plan of co-operative development and operation designed to promote more orderly drilling and production than would otherwise occur.

"'*Key Well*'. The initial well in a newly discovered pool, or in an extension of a known producing district, which by agreement made before the well is completed and based upon a consideration such as promised contribution of dry-hole money, is to be restrained in production for an agreed length of time following completion. The significance of the key well arrangement is that it permits adjoining owners to postpone the starting of offset wells until the key well has demonstrated whether the locality will produce and then, by shutting down or pinching in the production from the key well for the period of time necessary to complete the offsets, prevents drainage and gives all the wells an even start.

"'*Acreage Spreads*'. Practice of acquiring a number of tracts or leases distributed over a prospective oil or gas area in checkerboard or similar fashion.

Economic Advantages of Unitization Gaining Recognition

"The investigations of the committee disclosed that voluntary unitization has made marked progress during the past year; that nearly all of the major producing companies and many of the smaller operators now recognize its potential benefits including, (a) saving in number of wells necessary to develop a given area; (b) conservation of gas; (c) equitable and efficient utilization of the gas pressure; (d) orderly production, and, (e) greater ultimate recovery; and, for these reasons, many companies are now active in bringing about unitization of acreage about to be tested.

It is generally conceded that the American producer is distinctly at a disadvantage under old time wasteful competitive drilling methods in comparison with the foreign producer who operates large concessions under single or unified ownership and that the necessity for economy and efficiency in development and operation of our oil areas will force an evolutionary change from the former practice to unified control.

"It is pointed out, also, that while gratifying results have been obtained from the various curtailment and proration arrangements made and carried on by joint action of the operators and state authorities, these are, after all, only temporary expedients none too stable in character and must be supplemented and eventually supplanted by the more certain and effective stabilizing influence of unit operation.

Impediments to Progress

"In addition to the varied terms and conditions of leases there have been other impediments to the progress of voluntary unitization. Prominent among these has been the attitude of lessors and of some operators with a lack of understanding of what unitization is and the benefits to be derived therefrom; also the time honored custom of the lease broker of selling acreage spreads.

"The broker, however, has discovered that he can sell undivided interests in his block of acreage with as much ease as he formerly sold separate tracts or leases and that, in fact, he can complete the promotion more expeditiously under the new method than under the old system.

"As to the lessor or royalty owner, it is believed that he will join the movement in time because unitization

will broaden his chance of success by giving him an interest in the entire area, and a greater possible recovery. But it is submitted that it is not indispensable to the success of unitization that the royalty interests be included. Successful unit development may be effected by the working interest, without affecting royalty rights, due care being exercised in the location of wells to prevent drainage or other violation of underlying lease contracts.

"In the case of the uninformed operator who opposes unitization because he believes it will interfere with his freedom of operation, it should be pointed out that he may sell or assign his undivided interest in a unitized area with the same facility that he could sell separate leaseholds; that if he is a competent operator there is no reason why he may not be chosen as the operator of unitized areas and thus be enabled to keep his organization busy; and that at all events he will prosper from the improved condition of the industry resulting from stabilization.

Measures Suggested to Facilitate Unitization

"Since much of the opposition to the unit plan arises from lack of acquaintance with the practical details thereof, this committee suggests that familiarity with the terms of unit contracts and practices will aid in extending unitization. We therefore submit herewith, as Appendix 'B,' a suggested model unitization agreement for use in the ordinary case where the acreage is held in divided tracts and the desire is to unitize for the purpose of beginning development. This form contains the 'Committee' method of direction and control. Appendix 'C' is a somewhat similar contract but makes use of a Trustee and is known as the 'Trustee Form.' The provisions of such a contract may be changed to suit the peculiar conditions of each case.

Provision for Adjustment of Values and Amount of Acreage Within the Pool

"Where questions arise as to the relative value of tracts or leases to be contributed or as to the amount of acreage properly to be included or as to where the boundary should be, the contract may provide for subsequent adjustments and refixing of the proportional interests. This provision may consist of a simple agreement between the parties or the adjustment may be secured by bond or by a reserve set up for that purpose. Appended hereto as Appendix 'D' is a copy of an actual contract of this nature in which the subsequent adjustment is provided for by simple agreement.

Cooperative Agreement

"In cases where it is not possible to persuade owners of acreage to unitize, much good may be accomplished by means of an agreement for cooperative development and operation. The need for such an agreement frequently arises in trend plays or extensions to known pools. Here the agreement may provide that the initial well in the extension area, designated a key well, shall be held back in production for a stated length of time, usually the length of time required to drill offsets. The consideration supporting this waiver of discovery rights usually consists of undertakings on the part of surrounding owners to contribute to the cost of the well in case it fails to produce. The contract should contain, in all cases, provision for regulating and controlling the production in the interest of conservation. A suggestion for this type of agreement is attached as Appendix 'E.'

Code of Practice to Support and Promote Unitization

"Of vital importance to the unitization movement is the supporting policy on the part of operating companies that they will not purchase spreads of acreage about new drilling projects nor agree to make dry hole contributions unless the acreage is to be unitized or a cooperative plan of development and operation agreed to.

"While this may be said to be the policy of an impressive number of oil producing companies in the Mid-Continent field at the present time, the whole structure is weakened by a tendency on the part of some to recognize exceptions. One exception leads to another and every exception made tends to destroy confidence that there is a serious intention to adhere to the policy.

"For these reasons we recommend that no exceptions be made other than the one recognized in the subjoined suggested Rules of Practice.

Rules of Practice

"I. The oil pool rather than the individual tract or lease is the natural competitive unit in the oil producing business and all future development should be on this basis.

"II. The buying of divided tracts or spreads of acreage as a means of promoting or financing new development projects is inconsistent with and in opposition to unit development.

"III. Agreements to contribute dry hole money to procure tests of new prospective areas constitute an antiquated and deleterious practice unless confined to cases where a cooperative agreement has been made to insure orderly development and production when oil is found. The only permissible exception to this rule is in the case where all the conditions are known and only small wells or pools can be expected to result from the drilling. Small wells are defined as those not capable of producing more than 100 barrels per well per day.

"IV. The same economic considerations which prohibit the purchase of spreads of acreage and the contribution of dry hole money require also that no new drilling projects should be undertaken in checkerboard areas until every effort has been made to unitize or to effect a cooperative agreement even though there is no occasion or request for purchase of spreads or contributions of dry hole money.

"V. Complete frankness, mutual confidence and trust are essential to success in the unitization movement. It is therefore recommended that the policy be adopted of revealing to each prospective member of a unitized pool the geological information in possession of each participant therein, including the results of core drilling.

"VI. The practice of 'top-leasing' is regarded as unethical in the oil producing business. Negotiations by strangers to the title to procure leases to take effect in the future are in derogation of the rights of lessees under valid existing leases in that they force drilling and interfere with efforts to unitize or form cooperative agreements.

"VII. In order to promote the suc-

W. N. Davis Again Heads Oil Association

TULSA, Nov. 30.—Directors of the Mid-Continent Oil & Gas Association met Nov. 26 and for the tenth consecutive time elected William N. Davis, of Bartlesville, Okla., president. Expressions of praise at the vigorous campaign Mr. Davis has conducted over the past year in promoting unit developments were voiced by several directors.

Vice-presidents for the ensuing year were chosen as follows: for Oklahoma, Wallace C. Franklin, vice-president of the Tidal Oil Co., Tulsa; for Texas, J. D. Corlett, independent operator, Fort Worth; for Louisiana, F. Ray McGrew, vice-president, Standard Pipe Line Co., Inc. Harry H. Smith, who has been secretary of the association almost since its inception, was again chosen for that position.

Directors approved the report of the unit development committee, published elsewhere in this issue. They also, upon request of Homer F. Wilcox, discussed the subject of holiday observance.

Mr. Wilcox made the point that companies now have no concerted schedule of holidays and he thought much confusion would be avoided by association action. It was agreed that New Year's day, Memorial day, Independence day, Labor day, Thanksgiving day, Christmas day should be observed. Sentiment of the membership is to be developed with respect to office closing on either or both Washington's birthday and Armistice day.

cess of the unitization movement by allaying suspicion or refuting rumors as to alleged infractions of the policy against purchase of spreads and contributions of dry hole money, it is suggested that each operator make it an invariable rule to file with a central agency complete reports of exceptions made to Rules II and III, together with the reasons therefor, and showing the approval thereof by a chief executive of the company; and that such reports be kept on file and open to inspection by all bona fide operators. The practice of also filing with said agency copies of completed unitization contracts and cooperative agreements for distribution would aid in the educational phase of the movement. The logical agency for this purpose in the Mid-Continent Field is the Mid-Continent Oil & Gas Association and its various divisional offices.

Conclusion

"In conclusion, your committee recommends the adoption of this report as a statement of principles and policy and the appointment of a standing Unitization Committee charged with the duty of keeping in touch with the unitization movement and of issuing a handbook of information on the subject for general circulation."

Richfield-Rio Grande, Magnolia-White Eagle in Merger Talk

CLEVELAND, Nov. 30

TWO large oil company mergers are reported to be under way. One is a consolidation of the White Eagle Oil & Refining Co. with the Magnolia Petroleum Co. (Standard Oil Co. of New York), and the other is one of the Richfield Oil Co. of California and the Rio Grande Oil Co.

White Eagle would give the Magnolia distribution in Kansas, Missouri, Iowa, Nebraska, Colorado, Wyoming, Utah, North and South Dakota, Montana, and Wisconsin.

At the end of last year White Eagle owned or had under lease almost 1000 bulk and service stations in the middle west.

The company also has three refineries: one at Fort Worth, another at Augusta, Kans., and a third at Casper, Wyo.

Early in November, the company's crude production was averaging 4127 barrels a day as against 1835 barrels daily early in November, 1928.

In the first 10 months of 1929 sales through White Eagle stations of all its products totaled 91,562,776 gallons as compared with 79,571,644 gallons in the first 10 months of 1928, officers recently notified stockholders. They predicted that net earnings per share in 1929 would be between $3.50 and $4. Last year the company netted $3.03 a share.

The Magnolia is one of the leading operators in the southwest. It has crude oil supply and large refineries but its domestic distribution is limited to Texas, Oklahoma and Arkansas. Acquisition of White Eagle would give it larger domestic market outlets. For years it has supplied a large part of the export requirements of the Standard of New York.

Should the negotiations between Richfield and Rio Grande lead to a merger, it would carry Richfield into inland operations, a place the company has not heretofore operated. All its expansion in the marketing field has been in states which it can reach by water, either the Atlantic or Pacific ocean. Its production is confined to California where its refineries are located. However, it recently bought an interest in the Tiona Refining Co. at Clarendon, Pa., which has made its Pennsylvania grade motor oils for several years.

During the first nine months of 1929, Richfield produced 11,659,612 barrels of crude oil and natural gasoline. Its gasoline sales in the nine months totaled 351,952,310 gallons, an increase of 176,470,328 gallons over sales in the first nine months of 1928. This was a gain of a little more than 100 per cent.

The Richfield Oil Corp. of New York, a wholly owned subsidiary which was formed by the consolidation of the Acewood Petroleum Co., Walburn Petroleum Co., and numerous marketing companies in Atlantic seaboard states, sold 37,564,675 gallons of gasoline in the third quarter of 1929. The 1930 sales expectancy of the eastern company is estimated at 270,000,000 gallons.

The Rio Grande Oil Co. grew out of the operations of the Lockhart family of El Paso, Texas. The company began as a marketing organization in El Paso, acquired some Texas production, built a refinery and then spread westward to California where it has both producing properties and refining facilities. The company expanded rapidly last year when a large amount of new capital was put into the enterprise.

* * *

TULSA, Nov. 30.—That the control of the White Eagle Oil & Refining Co., with headquarters in Kansas City, has been acquired by the Standard Oil Co. of New York, is the report carried in the latest press dispatches. Reports and rumors for some time have linked the White Eagle with Magnolia Petroleum Co., also a subsidiary of S. O. of New York, but according to the latest news stories, Magnolia officials entered into the matter merely in the capacity of checkers of the properties for the parent company.

The news stories indicate the control was acquired on the basis of exchange of eight and one-half shares of S. O. of New York for 10 shares of White Eagle stock. L. L. Marcell, chairman of the board, would retire, according to the press reports, and early in 1930 leave on a tour of the world. R. R. Irwin, president of White Eagle, would retain his position.

Officials of White Eagle Nov. 30 declined to affirm or deny the press reports.

Standard-I. G. Co. Manages Bergius Process

NEW YORK, Dec. 3.—The Standard-I. G. Co. has been formed to manage the business end of the development of the I. G. Farbenindustrie hydrogenation process for the manufacture of petroleum products. The technical work in this country on development of the process and construction of plants will remain for the present with the Standard Oil Development Co., a subsidiary of the Standard Oil Co. of New Jersey.

This announcement, released today, will be made in a forthcoming issue of The Lamp, official organ of the Standard Oil Co. of New Jersey. Standard Oil of New Jersey owns the majority of the stock in the Standard-I. G. Co., and will assume responsibility for its management.

Officers of the company are: president, F. A. Howard, vice president of the Standard Development Co.; vice president, E. M. Clark, president of Standard Development Co.; secretary, M. H. Eames, secretary Standard Development Co.; treasurer, R. P. Resor, treasurer Standard Development Co.

The directors are E. M. Clark, Walter Duisberg, R. T. Haslam, F. A. Howard, Peter Murll, H. A. Riedman, H. G. Seidel, C. A. Straw, Otto von Schrenk, and Guy Wellman.

Announcement that a company would be formed was made by the Standard of New Jersey Nov. 23, and published in NATIONAL PETROLEUM NEWS, Nov. 27, page 34.

The current announcement reiterates that the hydrogenation process would be offered for license at the earliest practical time. Work is progressing rapidly, it is stated, at the three commercial oil plants for operating the process at Bayway, N. J., Baton Rouge, La., and at Baytown, Texas.

American Petroleum Institute . . . Chicago, Dec. 3-5, '29

Vapor Phase Cracking of Low Grade Oils At 1,050 F. Found Practical

By Luis de Florez*

(*Presented before American Petroleum Institute, Chicago, Dec. 3 to 5*)

THE customary classification of cracking in terms of liquid phase and vapor phase has persisted with more regard for tradition than for fact. In actual practice, a cracking operation producing a gasoline bearing a resemblance to straight run products and accompanied by a relatively low production of process gas, is referred to as a liquid phase process without much regard to the relation of temperature and pressure. A vapor phase process, on the other hand, is customarily regarded as one producing highly unsaturated distillates and a relatively large proportion of gas.

Common usage designates cracking operations more in accordance with the nature of the ultimate results than with the characteristics of processing, and thus tends to maintain the existence of a confusing and arbitrary line in the wide borderland which links so-called liquid phase and vapor phase cracking.

A survey of existing practice reveals the interesting fact that products attributed to liquid phase and to vapor phase cracking can be produced within a temperature range of the order of 200 F. and a pressure range of about 300 pounds per square inch. Inasmuch as the characteristics exhibited by the products of cracking operations are fundamentally dependent upon the temperature and the density maintained during the reaction time, limitation of the use of equipment to one class of operation does not seem justified.

This consideration suggests the possibility of developing a cracking unit in which the factors of temperature, time, and pressure can be varied sufficiently to extend its operation to the manufacture of products of either the liquid phase or vapor phase type.

The desirability of such a development is evident. Cracking in the so-called liquid phase, at comparatively low temperatures, has been perfected as the result of a vast expenditure of energy and money, and has become an accepted and necessary means of manufacturing gasoline. So-called vapor phase cracking, on the other hand, at higher temperatures and generally lower pressures, has been considered, heretofore, less suited to the economic needs of the industry, in view of the relatively large production of non-condensible products which attend such processing.

Under ordinary circumstances, it cannot compete in efficiency as a gasoline process, but has received commercial consideration chiefly for the production of its anti-knock values to meet the growing demand for them in modern gasolines.

It is recognized that vapor phase cracking has merit, but the industry has been reluctant to commit itself to large expenditures for highly specialized equipment, when the ability

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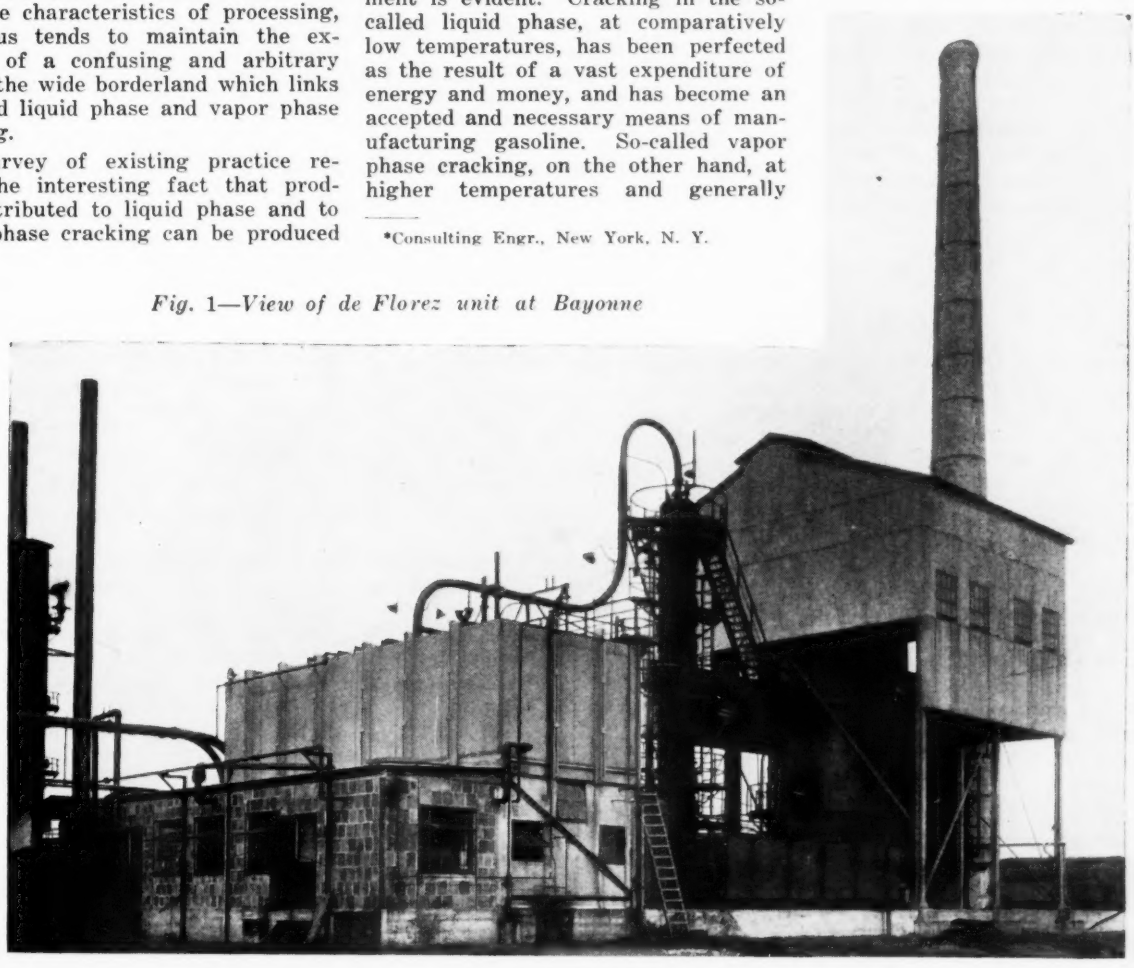


Fig. 1—View of de Florez unit at Bayonne

of such equipment to compete with standard processing requires the consideration of variable conditions such as: the market for the gas produced, the demand for anti-knock gasoline at a premium, and the absence of crudes with high natural anti-knock values.

The advent of equipment capable of a wide range of results would permit commercial experiments with other operating methods without the financial hazard, thus removing one of the chief obstacles to progress in extending the usefulness of cracking to fields which are not limited solely to the manufacture of anti-knock products.

THE problems involved in the design of a cracking unit capable of a wide range of operation are not merely of a structural nature; provision must be made to permit a more or less independent control of the operating factors, such as temperature, pressure and time, in order to bring about the required conditions to produce the type of results desired. These problems present many difficulties, none of which, however, precludes a practical solution if attacked with the clear understanding that cracking at various parts of the scale differs more in detail than in theory of processing.

A solution to these problems has been found in the evolution of a design combining certain structural features and an operating cycle which can be balanced with widely differing rates of cracking per pass. The discussion of this design and its reduction to practice constitutes the subject matter of this paper.

A cracking unit, embodying most of the characteristics sought, was erected at Bayonne, N. J., in 1927, and has now been in operation for a little less than two years. The unit has a charging capacity of about 1,000 barrels per day of heavy crude, and comprises a heater of approximately 1500 square feet of effective surface, an expansion chamber and fractionating tower 43 x 4 feet, and about 2000 square feet of condensing surface.

It has been operated principally on Venezuela crude as charging stock, with a few periods of gas oil operation. Up to the present, it has functioned at the higher temperature ranges, which usually offer the greatest difficulty to continuous operation with heavy charging stock and the most promise for the production of anti-knock distillates.

The effect of varying temperatures and pressures has been studied, and it is proposed to continue the study of results, not only under extreme operating conditions but in the intermediate ranges as well. Obtaining reliable data involves long periods of operation under given conditions, which necessarily lengthens the task of research in the fild of processing.

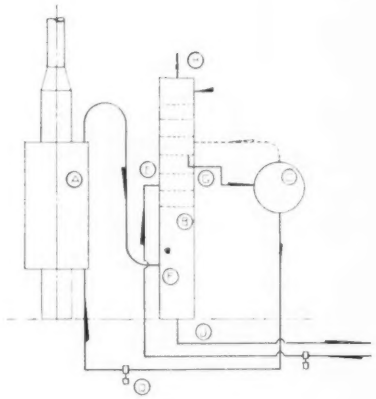


Fig. 2

The adaptability and efficiency of the equipment, however. has proved successful beyond expectation, and has led to the construction of other similar units whose operation will shortly afford additional sources for commercial data to supplement the existing work.

The operating cycle of the unit is broadly illustrated in the accompanying Fig. 2, where A represents the heater, B a combined expansion chamber and fractionator, C an accumulator tank, and D a circulating pump for cycle stock. The charge enters the expansion chamber at E, where it comes in contact with the products discharged from the heater A, which enter the expansion chamber at F. The charge is heated by the products entering at F, and subjected to a cracking distillation which causes the light vapors and recycle stock to ascend into the fractionator.

THE cycle stock is drawn off at an intermediate point G above the charge inlet, passing into tank C from which it is picked up by the circulating pump D, delivered under pressure to the heater A and, after heating, is discharged into the chamber B, completing the cycle. Naphtha and noncondensible gases are drawn off at the top of the fractionator at H, while the residuum or bottoms are drawn off at the base of the chamber at J.

It may be considered that the unit effects cracking in two ways: primary cracking in the heater coil, and a secondary cracking in the base of the chamber B. The primary cracking is regulated by raising or lowering the outlet temperature of the heater, or by increasing or decreasing the circulation of the cycle stock. The secondary cracking, on the other hand, is regulated by varying the quantity of products retained in the base of the chamber and variations of pressure.

The over-all cracking effect may be modified by the relative extent of cracking in the coil or in the chamber. One is, of course, not entirely independent of the other, but their proper combination permits sufficient variation to obtain the desired flexibility in the formation of various kinds of products. When operating at high temperature and low pressure, virtually all the cracking takes place in the coil and, as might be expected, the resulting products are of the type attributed to vapor phase operation.

As the pressure on the system is increased, more cracking can be accomplished in the chamber without coking, the effect of which becomes noticeable in the breaking of the viscosity of the residuum. Concurrently, the character of the distillate changes toward the type usually attributed to liquid phase cracking, the change becoming well defined when pressures of 50 or 60 pounds are reached, the temperature conditions remaining constant. By gradually lowering the heater temperature and raising the pressure, the character of the operation can gradually be changed to obtain results attributed to a liquid phase process.

IT IS evident from the arrangement that a separation takes place in the base of the chamber B carrying the cycle stock, gasoline and non-condensible gas overhead, leaving the carbon-bearing residual products in the base of the chamber from which they may be drawn off at will. The cycle stock, which is composed of distilled charge and products requiring further cracking, is subjected to fractionation through bubble trays to emiminate any material which might deposit upon vaporization.

This feature is requisite to high temperature operations and extremely desirable for low temperature work, as it permits the heater to function at all required temperatures almost indefinitely without the necessity of cleaning. The arrangement also permits subjecting the heavier portions of any type of charging stock to whatever extent of cracking may be desired, without recourse to the high pressures normally required when such products are cracked in a pipe coil.

The cycle stock is not only cracked by its passage through the heater, but also serves as a carrier of heat to effect the distillation and cracking in chamber B. The heat requirements at this point obviously vary with the

grade of charging stock, and the extent of the distillation and cracking to be performed. The heat requirement is balanced roughly by the temperature of the heater discharge and the rate of circulation established.

The extent to which these factors can be varied is somewhat limited by the extent to which it is desired to crack in the coil, and for practical operation it is found desirable to vary the temperature of the charge by preheat and to employ reflux to obtain an accurate balance. Experience has shown that this balance is not difficult to obtain, and that the permissible variation is quite sufficient to take care of any class of charging stocks, ranging from gas oil to topped crudes, and for operations at high or low temperatures.

In cracking at very low pressures, it is interesting to note that the heat requirement, per pound of charge to the heater, is nearly double that required for usual pressure operations. Consequently, the amount of heat delivered to the chamber B is considerably greater per unit of circulation. It is found to be in excess of that required for operation on gas oil, which means, that cooling must be effected, resulting in a loss of heat.

If topped crude is charged to the system, however, this heat is employed usefully in distillation and secondary cracking, making the process thermally more efficient, reducing the heat requirements to about the same figure as is normally found in ordinary pressure still work.

Numerous heat balances have been made with different operating conditions, the result of which points clearly to the fact that the use of gas oil in high temperature, low pressure treatment is an inherent disadvantage thermally. Many schemes for heat exchange are possible, of course, but none can compare in simplicity to the utilization of excess heat by direct contact with heavy products to perform useful work. This fact, taken in conjunction with the relative lower market price of heavy charging stock, clearly points to their desirability for treatment in this manner.

The Bayonne unit, which has been used to determine the characteristics of operation of the cycle, was purposely made extremely simple, and when first constructed was not provided with heat exchangers or adequate gas recovery equipment. These features have been added to the design of units now under construction and incorporated in Fig. 3, which illustrates diagrammatically the physical arrangement of the equipment. This arrangement is virtually the same as the Bayonne unit with the exception of the chamber and fractionator, which have been separated into two towers for structural reasons, and the features mentioned added.

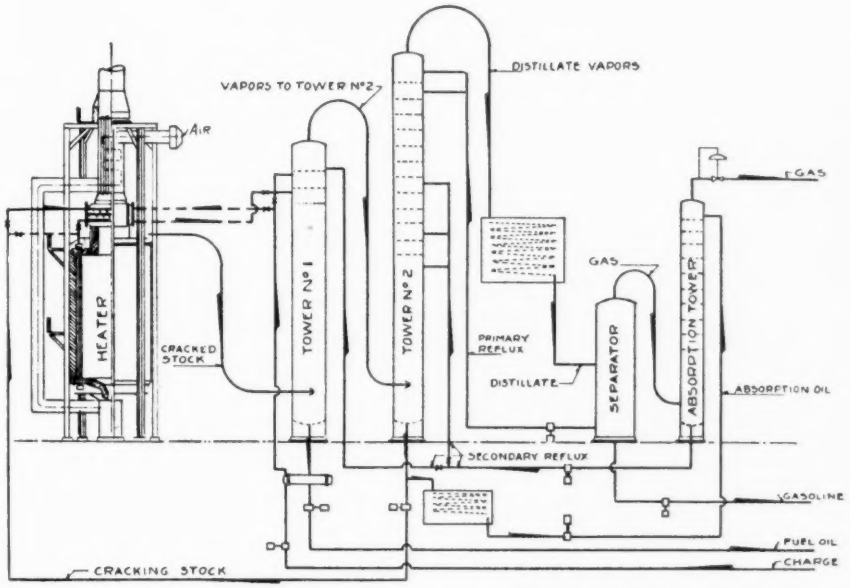


Fig. 3—Typical flow diagram of de Florez cracking unit

As shown in Fig. 3, the unit comprises a vertical tube heating element, a primary tower providing an expansion chamber and recycle stock fractionating column, a secondary tower providing a cycle stock accumulator and a gasoline fractionating column, a condenser, a gas separator, and an absorption tower for the recovery of gasoline from the gas, together with such supplementary equipment, in the form of heat exchangers and reflux condensers, as may be necessary for efficient operation.

The charging, stock, after passing optionally through heat exchangers, is admitted to the primary tower, where it meets the products discharged from the heater. The resulting cracking distillation throws over into the secondary tower the recycle stock together with the gasoline vapors and process gas, leaving the heavy bottoms from the charging stock in the base of the primary tower. From the reservoir in the base of the secondary tower, the recycle stock then passes to a circulating pump and is delivered, at high pressure, from the circulating line to the heating elements.

CONTROL in both primary and secondary towers is effected by reflux, utilizing cooled recycle stock for the primary tower and cracked distillate from the gasoline condenser for the secondary tower. The process gas released from the separator is passed through the absorption tower, where the gasoline values are scrubbed out with a portion of the cooled recycle stock.

The enriched absorption oil is then utilized as reflux for either the primary or secondary tower, as may be desired. It is to be noted that, if necessary, additional preheat may be given to the charging stock by utilizing a portion of the heater surface before admission to the primary tower.

The practical operation of the unit is largely dependent on the control and the handling of the cycle stock to the heater and the separation of the vapors and liquids in the base of the mixing chamber. The quality of the cycle stock is maintained within definite limits by fractionation through bubble trays against a positive gas oil reflux and continuously observed in a sight glass placed on the control board.

It has been found that its color can be relied upon to indicate its carbon forming properties which, coupled with its gravity, constitute a simple method of determining its character. It is drawn from the fractionator in a liquid state at a temperature of between 500 and 600 F., subjected to whatever pressure may be desired to force it through the heater, and then accurately measured through an orifice meter which permits control of its flow.

By utilizing comparatively high pressure drops, of the order of 300 pounds per square inch, it is possible to pass it through the heater at very high velocity, which not only permits efficient heat transfer, but avoids any possibility of local heat or parasitic

cracking on the walls of the tubes leading to carbon deposit, particularly at high temperatures. The combination of eliminating material which might deposit upon vaporization, and the employment of high velocity, permit the heater to operate for indefinite periods without cleaning.

The incoming vapors from the coil, containing in some cases entrained droplets of tar, are brought into intimate contact with the liquid in the base of the tower, where heat interchange and tar separation without entrainment is obtained by centrifugal action. The centrifugal effect is obtained by admitting the heater discharge through a nozzle tangent to the walls of the chamber, setting up a rotation of both liquid and vapor which not only facilitates separation but actually creates more disengaging surface by giving the liquid a concave form.

An efficient separation at this point is extremely important, as the formation of carbon in the bubble trays would seriously reduce the operating time. The positive nature of this separation is evidenced by samples, drawn from the center of the mixing chamber beneath the bubble trays, and which are found to consist of translucent gas oil regardless of the character of charging stock processed.

This arrangement not only permits the use of a smaller separating space, but avoids the possibility of forming carbon due to alternate wetting and drying of surfaces; likewise, it induces efficient heat transfer, permitting a higher temperature to be carried at the bottom without coke deposit, which is further inhibited by constant agitation.

THE design of the heating element is of outstanding importance in the combination to obtain the desired operating range of temperatures and pressures required of the unit. This element comprises a steel shell lined with fire brick, in which the tubes are disposed vertically around the circumference of the inner wall. The burner is located at the base of the structure, causing products of combustion to travel upward through the radiant chamber, through the economizer section, passing between the tubes in this section and thence through the superimposed air preheater to the stack.

The air for combustion travels around the fire tubes of the air preheater and thence to the burner, which subsequently increases the temperature of combustion. The heat transfer to the oil tubes is effected mainly by radiation which insures maximum heat transfer at all points under all firing conditions.

The small economizer section acts also as a screen for the protection of the tube sheet of the air preheater. In all cases combustion conditions, with practically no excess air, are maintained, and the flame burst temperatures are carried as high as possible. It is practicable to do this, since the heat absorbing surface is so proportioned to the amount of fuel burned that a balance is obtained between the heat withdrawn from the surface and the heat input from the burner which permits only the tube walls to attain a chosen maximum temperature. In other words, the oil which is being pumped through the tubes absorbs heat at such a rate that a high differential is maintained between absorbing surface and the flame proper.

There is no tendency for even an intense flame to overheat any one tube, since in this case all of the tubes are equally spaced at a safe distance from the flame and perform substantially the same duty. At any duty less than the maximum for which the heater is designed, resulting tube temperatures will be reduced well below those permissible.

This type of heating unit has the advantage that it makes possible the heating of the oil to high temperatures economically without overloading any one portion of the heating surface. Furthermore, the reduction of free oxygen in the combustion gases to a minimum prevents oxidation of the outer tube surfaces. By disposing the tubes vertically, the possibility of sagging is eliminated. The heater has structurally interesting advantages, which need not be discussed in this paper.

The unit, as a whole, is remarkably responsive to control, and once stabilized does not exhibit any tendency to become unbalanced. It can be actually put on stream within two hours of firing and is capable of long periods of continuous operation. An examination of the equipment after 600 or 700 stream hours indicates that much longer runs are possible, although at present it is the practice to limit their duration for the purpose of inspection. Adjustments for variation of charge are simple, and it has been found that the presence of water in the charge causes relatively little disturbance in the system.

Perhaps it should be mentioned that the controls of the unit are entirely centralized on one board, and that the operation can be carried out by a single operator, although two are usually employed per shift for the sake of safety and to obtain data which is constantly required for general information.

It will be evident that space does not permit recounting in detail many of the interesting results obtained during the course of this work, and that constant experimenting with operating combinations will furnish new and valuable data in a manner which appears at present unending. Neither is it possible to discuss numerous features whose combinations have been found to be vital to success. It may be said, however, that future work does not contemplate change in equipment which has proven itself beyond question and represents today a new tool, the varied uses of which will expand gradually.

THE following results are presented to illustrate the performance of the unit under various operating conditions, and to bring out certain facts which have been determined. These results do not represent best operating conditions, but are chosen primarily for the purpose of comparison, and should be distinctly regarded in this light. The yield figures must be viewed as conservative, since it is known that 2 per cent to 4 per cent additional gasoline yield can be obtained by adequate stripping of gas.

Fuel consumption for the unit varies mostly with the character of the oil charged, particularly since it is based on fresh oil charged to the plant. In the case of Venezuela crude, the over-all figure for fuel has averaged between 5 per cent and 6 per cent of the oil charged, and includes both the gas burned and the small amount of oil fuel used in starting up.

On gas oil the fuel consumption is of the order of 12 per cent, which appears higher on the charge basis; but, in view of the greater amount of processing and yields of the order of 60 per cent instead of 30 per cent, it is about as might be expected. It is felt that the fuel consumption can be still further improved, and provision is being made in new designs to incorporate profitable heat exchange equipment.

Table No. 1
Comparison of Venezuela Crude Non-Pressure and Pressure

	Venezuela Crude		
	Run 25	Run 29	Run 35
Stream hours	400	607	719
Temperature, deg. F. (heater outlet)	1,071	1,046	1,021
Pressure, lb.	21	78	78
Charge, bbl.	19,422	20,124	19,304
Charge, per cent	100.00	100.00	100.00
Yield			
Distillate, per cent	23.71	32.02	26.10
Straight run	7.00	6.00	5.75
Cracked	16.71	26.02	20.35
Residuum, per cent	69.07	58.64	62.70
Gas, per cent	6.39	10.16	10.60
Tests			
Charge			
A. P. I. gravity	19.2	20.5	19.0
Distillate			
A. P. I. gravity	54.5	56.7	56.6
End point, deg. F.	393	392	364
Color (Saybolt)	Yellow	—2	+1
Residuum			
A. P. I. gravity	11.2	10.0	9.9
Viscosity furol at 122 deg. F.	703	297	326

Table 1 illustrates the performance of the unit on three runs of approximately the same quantity of charge, under high temperature and different pressures. Run 25 was made at a temperature of 1071 F., and a heater outlet pressure of 21 pounds, while runs 29 and 35 were made with slightly lower temperatures and an average pressure of about 80 pounds.

Comparing the runs, it will be noted that increase in pressure has increased the yield of distillate and improved its quality, particularly with respect to color and treating properties. The production of residuum has been materially decreased and, at the same time, the viscosity has been improved and the gravity reduced.

Mention should be made of the increase of gas in the high pressure runs, which is directly due to more intense cracking and cannot be taken as a dependent effect of pressure. The charge stock in all three runs was the usual grade of Venezuela crude, which varies from 19.2 to 20.5 degrees A.P.I.

The crude varies somewhat in gasoline content, as is shown by the percentage of straight run and cracked gasoline in the distillate. Run 35 has been operated to produce a lower end point distillate, which accounts for the difference in distillate yield figures from run 29.

Table No. 2
Comparison of Runs at Temperatures 1,050-1,100 Deg. F.

	Pennsylvania Gas Oil	California Gas Oil	Venezuela Crude*
	80 Lb. Pressure		
Charge			
Bbl.	1,070	1,631	1,345
Per cent	100.00	100.00	100.00
Yields			
Distillate, per cent	61.40	53.89	36.40
Residuum, per cent	7.90	18.70	56.00
Gas, per cent	29.20	26.97	6.10
Distillate			
A. P. I. gravity	59.5	55.5	55.4
End point, deg. F.	416	412	403
50 per cent point, Deg. F.	253	283	282
Circulation			
A. P. I. gravity	34.6	28.1	26.3
50 per cent point, deg. F.	509	502	514
Charge			
A. P. I. gravity	40.0	32.4	20.1
Initial boiling point, deg. F.	430	456	149
Per cent over at 392 deg. F.	None	None	8.00
50 per cent point, deg. F.	546	516	.....
Residuum			
A. P. I. gravity	7.6	7.2	9.3
Viscosity furol at 122 deg. F.	280	280	165

*Period taken between 500th and 550th hour of operation.

Experience obtained on the relative merits of running at 80 pounds and pressures of the order of one atmosphere, clearly indicates that better operating conditions are obtained at the higher pressures with regard to the increase in distillate produced, the decrease and improvement of residuum, and better quality of distillates. These considerations, combined with the fact that the anti-knock properties of the distillates have have not been reduced with the increase of pressure, has led to setting aside low pressure operation at least for the present.

John R. Suman, general production executive, Humble Oil & Refining Co., Houston. As general chairman of the institute division of development and production engineering he has shaped the course of this institute branch during its two years of existence

Table 2 shows the performance of the unit on Pennsylvania gas oil, California gas oil, and Venzuela crude. In order to obtain comparisons, these figures were taken from test periods of operation during runs. The figures on gas oil represent composite results on various operating periods, and are not as favorable as might be expected from continuous operation under best conditions. They are useful, however, as they are indicative of the order of results.

Both Pennsylvania and California gas oil have been run to coke by returning the bottoms to the charging stock, and under these conditions it was found that yields of distillate could be increased but that gas yields rose out of proportion to the additional amount of distillate made as the bottoms became reduced to coke.

Perhaps the characteristic of greatest interest in high temperature distillates lies in their anti-knock properties, and constitutes one of the chief reasons for operating in this range of temperature. It is generally found that the anti-knock values of

distillates increase with operating temperatures.

The increase is very rapid up to a certain point, and then less marked. Since the increase in operating temperatures is usually attended by an increase in process gas, the anti-knock values are sometimes associated directly with increased gas production. It has been found that such is not necessarily the case; and, whereas the production of gas may increase indefinitely, the anti-knock values do not.

One of the difficulties of experimenting with anti-knock values lies in the difficulty of obtaining accurate ratings for distillates. For the purpose of this work, the anti-knock ratings have been obtained mostly by The Texas Co. rating.[1] In this scale, Pennsylvania gasoline is rated zero and commercial anti-knock gasolines about 25. It has been our experience that these ratings were more comparable between 20 and 30, and it has been the practice to dilute samples with known mixtures in order to obtain ratings within these limits.

An illustration of this method will be seen in Table 3, which shows an analysis of the blend stocks No. 1, 2, 3, and 4; No. 1 being straight run Venezuela gasoline; No. 2 cracked distillate formed at the normal gas rate which is about 10 per cent of the charge; No. 3 at 132 per cent, and No. 4 at 150 per cent of the normal gas rate.

These samples have approximately the same end point and gravity, and all the cracked samples contain a certain percentage of straight run which has been estimated as shown. These stocks were blended as shown in Table 3, and anti-knock ratings obtained.

It will be noted that the anti-knock ratings on the cracked samples themselves are approximately alike; viz, of the order of 33, and that this condition follows with diluted samples. It also shows that with plant straight run gasoline, such as obtained at Bayonne, a mixture of 25 per cent of cracked distillate with 75 per cent of straight run Venezuela will give anti-knock ratings for the blended product which compare satisfactorily with commercial requirements.

It will be evident from these results that anti-knock values of distillates are not commensurately increased with gasification beyond the normal rate chosen, which may be considered a desirable limit for operating on this charging stock.

Anti-knock values of distillates depend greatly on the character of the origin of the charging stock. Charging stocks derived from crudes which contain gasolines of favorable anti-knock properties will yield distillates with better anti-knock value than a charging stock obtained from crudes containing gasolines with inferior detonating characteristics. It is also noticeable that anti-knock values are not evenly distributed throughout the distillate. In the case of Venezuela crude, for instance, distillates with low end point of the order of 350 F. are substantially superior to those of 400 end point.

Table 4 shows a comparison between samples of distillates made at 15 pounds, 80 pounds and 100 pounds per square inch pressure, with approximately constant operating temperatures. It will be noted that the anti-knock values of all these samples are approximately the same, actually showing some improvement in the 100-pound pressure sample. This, however, must be modified by the con-

Table No. 3

Distillation of Blend Stocks Produced at Varying Gas Rates from 21.3 Gravity Venezuela Crude

Sample No.	1	2	3	4
Gas rate (orifice meter differential)	(Venezuela Straight Run)	40 in.	70 in.	90 in.
Per cent of normal	100	132	150	
A.P.I. gravity	53.5	54.4	54.2	52.9
Initial boiling point, deg. F.	112	100	96	102
End point, deg. F.	418	293	397	399
Per cent over at 221 deg. F.	19	22	21	20
Per cent over at 284 deg. F.	49	51	51	50
Per cent over at 392 deg. F.	93	94	93	93
50 per cent point, deg. F.	286	282	282	284
Per cent recovery	97	95	95	95
Str. run per cent of charge	.....	7	7	7
Str. run per cent of dist.	100	25	25	25
Cracked per cent of dist.	0	75	75	75
Anti-knock rating	15	32	33	33

Blends

Sample	Actual Per Cent Straight Run Content		Actual Per Cent Cracked Content	Anti-Knock Rating
5	62.50	50 per cent No. 1 and 50 per cent No. 2	37.50	30
6	62.50	50 per cent No. 1 and 50 per cent No. 3	37.50	31
7	62.50	50 per cent No. 1 and 50 per cent No. 4	37.50	30
8	81.25	75 per cent No. 1 and 25 per cent No. 2	18.75	28
9	81.25	75 per cent No. 1 and 25 per cent No. 3	18.75	28
10	81.25	75 per cent No. 1 and 25 per cent No. 4	18.75	28

Gas Rates

Gas Rate Per Cent Normal	Meter Rates	Oil Circulated Bbl.	M Cu.Ft.	Equivalent Bbl.	Per Cent of Oil Circulated
100.00	40 in.	1104	265	75	6.8
132.00	70 in.	1104	350	90	9.0
150.00	90 in.	1104	397	113	10.2

Table No. 4

Effect of Pressure on Character of Distillate

	15 Lb. Per Sq. In.		80 Lb. Per Sq. In.		100 Lb. Per Sq. In.
A.P.I gravity	52.7	52.9	52.7	53.8	57.1
Initial boiling point, deg. F.	107	104	120	100	98
End point, deg. F.	397	380	406	390	371
50 per cent point, deg. F.	274	276	300	284	248
Color (Saybolt)	Yellow	Yellow	+7	0	+15
Gum (copper dish)	604	576	.....	207	110
Gum (after dilution with equal volume of straight run gasoline)	.....	.....	.....	.....	13
Anti-knock rating	32	33	32	33	35

[1] MacCoull, Trans. Soc. Auto Engrs., 23, 63 (1928).

sideration of the lower end point which would normally give higher anti-knock rating.

It will also be noted that the color of the samples has been improved by pressure operation, at the same time the gum content has been reduced. It has been generally found over long periods of operation that pressure of the order of 80 to 100 pounds has reduced the gum content of distillates from 500-600 to 100-200. These results, together with others, indicate that operating under pressures of the order of 100 pounds is not appreciably detrimental to anti-knock values as is sometimes believed.

The treating of distillates formed at temperatures of about 1050 F. and moderate pressures can be accomplished much more readily than with those formed at low pressures and equal operating temperatures. The pressure distillates can be treated with 6 pounds of acid to make a satisfactory finished product. In this connection, it has been found that about 25 per cent of such distillates requires no treatment beyond alkali wash and sweetening.

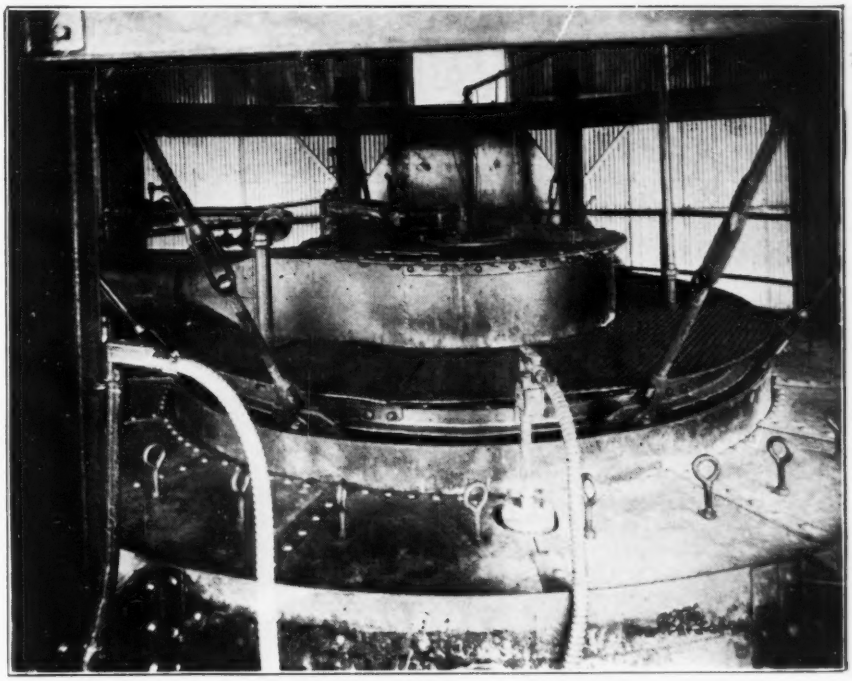


Fig. 4—Top of de Florez circular still

This portion of the distillates, which contains the lower boiling fractions, can be readily segregated and the acid treatment confined to the heavier portions, which suffer less from vaporization in refining. This method of handling distillates also results in better anti-knock properties in the finished product. Several methods are available for treating unsaturated distillates. Acid treatment has been used, however, as it is well-known, simple, and furnishes an excellent basis for comparison.

In the treatment of distillates, it is somewhat difficult to arrive at what constitutes a satisfactory finished product, particularly from the point of view of gum content. The usefulness of the copper dish gum test is generally distrusted, and there is no doubt that the accepted standard imposes unnecessary conditions on distillates of this character.

The purpose of most anti-knock distillates is to find their way into blends of straight run gasoline, and the mere diluting of such distillates effects a very marked reduction on the gum content of the whole. Thus, distillates which may contain gums to the extent of 500 or 600 when diluted to 50 per cent with straight run, show a gum content of the order of 30 to 60 on the copper dish tests.

If, therefore, blends are to be made of the order of 50 per cent or less of cracked distillates, this phenomenon should be taken into consideration, and the requirement for gums on the cracked blend stocks need not be made so stringent as to require excessive treating, which usually tends to destroy anti-knock values which have been laboriously manufactured.

If the industry is interested in obtaining anti-knock values from cracked distillates, progress will be accelerated by an intelligent consideration of allowable limits for certain properties inherent in distillates of this character.

One of the main objectives of the development, which has been briefly reviewed in the foregoing, has been to study the commercial possibilities of producing anti-knock distillates by cracking. In view of the immense scope for research in this field, it seems presumptuous at this time to voice definite conclusions with regard to the most favorable operating conditions required for commercial operations, which must necessarily involve economic considerations as well as technical ones, and must vary greatly with charging stocks available.

Results obtained have justified the belief that cracking low grade charging stocks at temperatures of the order of 1050 F. is practical and economical, even when process gas is valued as fuel. They have also clearly shown that it is feasible to build a cracking unit, at moderate cost, which will operate effectually on widely differing charging stocks and under widely varying operating conditions.

This accomplishment is of major importance, as it furnishes a practical and conservative means of establishing an actual criterion of values between results of processing. In its present form, the unit not only satisfies the variable requirements of refinery operation, but constitutes a safeguard to the commercial experiments essential to progress in extending the useful range of cracking.

Acknowledgment is made of the untiring efforts and interest of M. J. Ball and the operating men connected with the work which, together with the valuable chemical research of E. D. Streeter and important contributions of J. W. Gray, have been so largely instrumental in obtaining practical results.

CHICAGO, Nov. 29.—The Globe Oil and Refining Co. of Illinois, a subsidiary company of Globe Oil and Refining Co. of Oklahoma, has contracted with the Texas-Empire Pipe Line Co. for delivery of 5000 barrels of Mid-Continent crude oil daily to their refinery at Lemont, Ill. The decline in production of Muskegon, Mich. crude, on which the Lemont plant is now operating, forced the company to make other connections.

The Texas-Empire line was recently completed to deliver crude to the Texas Co.'s refinery at Lockport and to serve the new plant of the Empire Oil and Refining Co. at Hammond, Ind. which is soon to be completed. The delivery of crude to the Lemont plant will start about Dec. 1.

American Petroleum Institute . . . Chicago, Dec. 3-5, '29

Chemical Inhibitors Stabilize Gasoline Color and Knock Rating; Retard Gum

CHICAGO

IT HAS been known for some time that cracked gasoline upon standing in storage frequently forms gum and goes off color.

It has only recently been found, however, that actual loss of anti-knock value also occurs frequently when cracked gasoline is stored for a considerable length of time. Some interesting discoveries in this connection have been made by Doctors Gustav Egloff, W. F. Faragher, and J. C. Morrell of the Universal Oil Products Company.

These discoveries were set forth in a paper, "Stabilization of Knock Rating, Gums, and Color of Gasoline by Chemical Inhibitors," prepared by these men and presented before the group meeting on refinery technology at the American Petroleum Institute meeting in Chicago.

Although the field has not been investigated thoroughly, it appears that the character of the charging stock used and the conditions under which cracking is carried on are factors which make for greater or less stability of cracked gasoline.

In the course of the investigation a number of chemicals were found which act to a greater or less degree as inhibitors to prevent formation of gum and color and loss of anti-knock rating. Also it was found that gasolines which have undergone such changes in storage can frequently be restored to their original character by treatment with certain chemicals.

That the degree to which degradation of gasoline takes place varies widely with different cracked fuels is shown by the fact that some samples examined showed no changes while others had depreciated by as much as 65 per cent from the original benzol equivalent. The samples had been stored for various periods, varying from six months to about two years. The samples tested were mostly from various Mid-Continent, California and Pennsylvania crudes and those from Arkansas fields.

The formation of gum and color forming substances, it was found, is largely an oxidation process and the products formed consist in part of peroxides, acids, aldehydes and ketones. Coincident with their formations there is sometimes a drop in knock rating of the gasoline.

Concerning the action of inhibiting chemicals, the authors of the paper say: "Aniline, hydroquinone, naphthalene and anthracene have been found in this investigation to inhibit the changes that decrease the knock rating during storage. The same substances are also effective in preventing a reduction in knock rating when the gasolines containing them are subjected to the accelerated oxidation test for gums proposed by Voorhees and Eisinger at the A. P. I. meeting in Chicago in 1928." This method consisted in heating the gasoline to a temperature of 212 F. in an atmosphere of oxygen for five hours.

The authors report that in a set of experiments using Pennsylvania cracked gasoline the accelerated oxidation test lowered the benzol equivalent from 40 to 29 per cent. The addition of 0.1 per cent by weight of aniline or hydroquinone to the cracked gasoline preserved the knock rating when the gasoline was subjected to the same accelerated oxidation test conditions. Naphthalene and anthracene also acted as inhibitors but to a lesser degree than aniline or hydroquinone.

In another set of experiments using a Mid-Continent cracked gasoline, aniline gave poor stability while the other inhibitors mentioned gave good results.

Tabular data confirming the statements of the authors' findings are included in the accompanying table.

Other points brought out by the investigation are as follows:

"Aniline is a stabilizer and also has antiknock properties of its own when added to gasoline. The increase of 4 per cent of benzol is the calculated amount for the quantity of aniline added.

"A California cracked gasoline showed marked stability in regard to knock rating when subjected to the accelerated oxidation test. This would indicate that the oxidation products in this gasoline did not affect its knock rating. Although the gum was increased by oxidation, the benzol

Effect of the Addition of Chemical Inhibitors on the Knock Rating of Pennsylvania Cracked Gasoline

	Original Gasoline	After oxidation	Aniline	Hydroquinone	Urea	Phenol	Naphthalene	Anthracene
I. B. P., deg., F.	94	114	112	105	130	114	108	122
E. P., deg., F.	427	434	429	430	431	432	434	445
Color Saybolt	24	−16	−16	Yellow	−5	Yellow	0	−2
Mgs Gum Glass dish	3	55	5	6	14	36	36	20
Mgs Gum Copper dish	19	220	55	16	56	139	241	75
Hydrocarbons[1]								
Per cent								
Unsaturates	24.0	23.0	.....	.....	.....	.....	.....	.....
Aromatics	22.9	22.5	.....	.....	.....	.....	.....	.....
Naphthenes	9.3	10.1	.....	.....	.....	.....	.....	.....
Paraffins	43.8	44.4	.....	.....	.....	.....	.....	.....
Delco Motor Test								
Benzol Equivalent Per cent	40	29	39	40	34	31	35	34
Midcontinent Cracked Gasoline								
I. B. P., deg., F.	103	114	106	110	108	107	108	118
E. P., deg., F.	320	335	319	313	301	302	313	312
Color Saybolt	30	7	−16	13	26	16	28	28
Mgs Gum Copper dish	68	475	389	26	198	131	126	73
Mgs Gum Glass dish	1	136	29	3	13	16	5	3
Hydrocarbons								
Per cent								
Unsaturates	36.2	41.1	.....	.....	.....	.....	.....	.....
Aromatics	12.0	7.8	.....	.....	.....	.....	.....	.....
Naphthenes	11.9	11.7	.....	.....	.....	.....	.....	.....
Paraffins	39.9	39.4	.....	.....	.....	.....	.....	.....
Delco Motor Test								
Benzol Equivalent Per Cent	56	37	34	52	40	47	47	47

[1]Egloff and Morrell, J. Ind. Eng. Chem., 18, 354 (1926). This method was used throughout.

equivalent was decreased only from 53 to 51 per cent and a Pennsylvania cracked gasoline subjected to the same conditions of oxidation decreased from 40 per cent to 29 per cent, while a Mid-Continent motor fuel dropped from 56 per cent to 37 per cent. This difference may be due to the nitrogen compounds present in the California cracked gasoline which act as anti-oxidants or inhibitors."

"From a study of the data there appears to be a relationship between the depreciation in knock rating and the increase in gum formations. Generally speaking, those materials which inhibit gum formation also check depreciation in knock rating, although there are some exceptions to this generalization, e.g., diehylamine will inhibit the depreciation of knock rating under the test conditions but does not prevent increase in gum. On the contrary it appears to promote gum formation. Other substances which act as inhibitors in preventing knock depreciation fail to prevent increase in gum."

The authors go on in the paper to review work that has been done on gum in gasoline and report as follows:

"A series of chemicals were tested as inhibitors of gum formation during exposure to sunlight in the presence of oxygen. The inhibitors were added to the gasoline in weights of 0.1 grams per 100 cc. Naphthalene, urea, pyrene, phthalic anhydride, and carbazole were effective in a Mid-Continent cracked gasoline. This cracked gasoline had a gravity of 58 A. P. I., an initial boiling point of 110 F., and an endpoint of 437 F.

"Very little is known about the composition of the coloring matter in gasoline. It has been generally assumed to result from the chemical changes of the more highly unsaturated compounds. Factors favoring the formation of gum in cracked gasolines, such as light, heat, and oxidizing agents usually cause the development of color.

"The decomposition of acid esters in improperly refined gasoline, and the reaction products of sulfuric acid generated from the alkyl sulfuric acids are responsible sometimes for the color. Elementary sulfur generally causes discoloration of cracked gasoline."

The authors go on to say that "A gasoline produced from a Mid-Continent cracking stock, treated with three pounds of 66 Be. sulfuric acid per barrel, water washed, neutralized and distilled with fire and steam at a temperature of 350 F., was used in one series of color-stability tests. The gasoline had a gravity of 58 A. P. I., an initial boiling point of 110 F., and an end point of 437 F.

One hundred cubic centimeter samples of this gasoline, containing 0.1 gram of a number of chemicals, were exposed to 24 hours of sunlight. The changes in the color and the gum content were then determined."

The gasoline before exposure had a color of 22 Saybolt; color after exposure, with no stabilizer present, was 17 Saybolt; the color after exposure to 24 hours of sunlight with the stabilizers named were as follows: Gum Camphor 22; Phenanthrene 21; Urea 21; Pseudo cumene 21; Acenaphthene 21; Methyl Naphthalene 20; Anthracene 20; Naphthalene 20; Fluorene 20; Tetralin 19; Naphthol 19; Hydroquinone 19; Phthalic anhydride 19; Phthalimide 17; 60 per cent Carbazole 15; Pyrene 10.

On restoring the original character of deteriorated cracked gasoline, the authors report:

"Good results were obtained in restoring the anti-knock properties of the Mid-Continent cracked gasoline by treatment with any of the following treating agents; fuller's earth, 75 per cent sulphuric acid, 95 per cent sulphuric acid, 16 Be. caustic soda, 40 Be. caustic soda; and borax in the rerun stills. With the same treating agents applied to a Pennsylvania racked gasoline, all but the fuller's earth and the 40 Be. caustic soda gave

—*Underwood & Underwood*

Lacey Walker, of the institute staff at New York, who is in charge of general statistical work of that organization and officially serves as secretary and assistant treasurer

partial or full regeneration."

The authors' conclusions follow:

1. Although most cracked gasolines are satisfactorily stable during storage with respect to color, gum and knock rating, there are some that deteriorate.

2. There is no regularity in the formation of gum and lowering of knock rating.

3. The accelerated oxidation test for gums is applicable as an accelerated test for depreciation of knock rating of a gasoline.

4. Chemical inhibitors have been found which prevent loss of knock rating during accelerated oxidation.

5. New chemical inhibitors have been found which prevent gum formation during the accelerated oxidation of gasoline. It is expected that they will be effective in stored gasoline.

6. New chemical stabilizers of color for stored gasoline have been found.

7. Processes for the restoration of cracked gasoline which had depreciated in knock rating have been developed.

Aluminum Foil Tank Coatings Resist Corrosion and Reduce Evaporation

By Stanley Gill*

(Presented before American Petroleum Institute, Chicago, Dec. 5)

THE use of aluminum and aluminum alloys in the oil industry has shown a remarkable increase within recent years.

A great impetus to this increase has been given by the development of numerous fields producing oils of high sulfur content. Hydrogen sulfide is a corrosive agent of great destructiveness and aluminum is, generally speaking, quite resistant to its action. The possibility of obtaining in aluminum or its alloys materials of light weight, great strength and high resistance to corrosion makes them applicable under a wide variety of conditions. The purpose of this paper is to present briefly the present status of the use of aluminum in the oil industry and to indicate, necessarily somewhat vaguely, the lines which will probably be followed in the extension of its use.

The commercially available aluminum alloys cover a wide range of composition and of physical properties. They range from high purity aluminum, which contains not less than 99.4 per cent aluminum, through a series of alloys containing greater or lesser proportions of various alloying elements. These alloys may, by appropriate heat treatment, be given physical properties covering a very wide range. Alloys possessing almost any desired combination of physical properties can be obtained in either cast or wrought form.

The differences in composition and in heat treatment which are needed in order to fit the physical properties to the requirements of various applications have considerable influence upon the relative corrosion resistance of the various alloys. Generally speaking, it cannot be stated just what alloy will possess the greatest corrosion resistance under any set of conditions, and it is usually necessary to test a series of alloys of proper physical characteristics in actual service before any conclusion can be reached on this point.

Certain general principles apply to the corrosion resistance of aluminum and of aluminum alloys. Aluminum is a highly electronegative metal which owes its corrosion resistance to an oxide film. Conditions which will result in the destruction of this oxide film will deprive aluminum of its corrosion resistance. Thus, aluminum and aluminum alloys are not resistant to strong alkalies. They are also destroyed by most strong mineral acids. Chlorides are, in general, quite destructive to aluminum and the aluminum alloys, although there are some conditions under which aluminum will stand up well in chloride solutions. Oxygen free solutions, especially if they contain any considerable amount of chloride, corrode aluminum quite rapidly. Aluminum is also particularly susceptible to pitting action under conditions which result in the formation of oxygen concentration cells. Thus, the presence of large quantities of dirt may result in corrosion of aluminum in a medium which would otherwise not affect it.

BECAUSE of its electronegative character, aluminum will undergo rapid corrosion when it is in electrical contact with other metals, or with materials such as iron sulfide, in a strongly corrosive medium. On the other hand, colloidal material in the corrosive medium will sometimes inhibit corrosion of aluminum, as will also soluble silicates, which are almost always present to some extent in oil field brines. This may account for the resistance of aluminum to such brines.

Much experience has shown that all of the commercial aluminum alloys possess a remarkable resistance to corrosion by gases or air containing

EXPERIMENTAL work carried on by the Gulf Pipe Line Co. in Texas in the use of aluminum foil for tank coatings is described in the accompanying article. The coatings have been found to reduce evaporation losses below those in tanks coated with aluminum paint and greater durability for them in the handling of sulfur crudes is anticipated.

These coatings were originally designed to apply to the insides of tanks exposed to severe sulfur corrosion. Their actual application for this purpose has been held up by the difficulty in obtaining an oilproof material of suitable adhesive properties.

The coatings have been used on tank cars and are being experimented now for the protection of pipe lines and are considered applicable for use on bulk storage tanks handling refined products.

*Gulf Pipe Line Co., Houston, Tex.

high concentrations of hydrogen sulfide at temperatures below 250 deg. F. For application under such conditions, it may be stated quite positively that aluminum will give satisfactory service.

Aluminum and its alloys should not be considered for service at high temperatures. The melting points of these alloys are relatively low, falling between 1000 deg. and 1200 deg. F. Below these temperatures, they show a great tendency to creep under load. The strong alloys of aluminum owe their remarkable physical properties to heat treatment; if held for any great length of time at an elevated temperature, they will lose much of their strength. For these reasons, aluminum alloys should scarcely be considered for use at temperatures above 250 deg. or 350 deg. F., and their greatest range of applicability lies at temperatures below 200 deg. F.

Use of Aluminum in Oil Well Equipment

Generally speaking, aluminum and aluminum alloys are entirely inapplicable for the construction of oil well equipment. This is in part due to their electronegative character, since the greater part of the material used in equipping oil wells must necessarily be of iron or steel which are electropositive with respect to aluminum. A far more important reason lies in the fact that aluminum and its alloys are not resistant to corrosion under the conditions usually encountered in oil wells.

Normal oil field brines are oxygen free, and contain large amounts of chloride, a combination which is extremely destructive to aluminum. In a series of tests of aluminum and various strong aluminum alloys in oil wells in Texas Gulf Coastal fields, these alloys had only one-half the life of ordinary steel or wrought iron pipe.

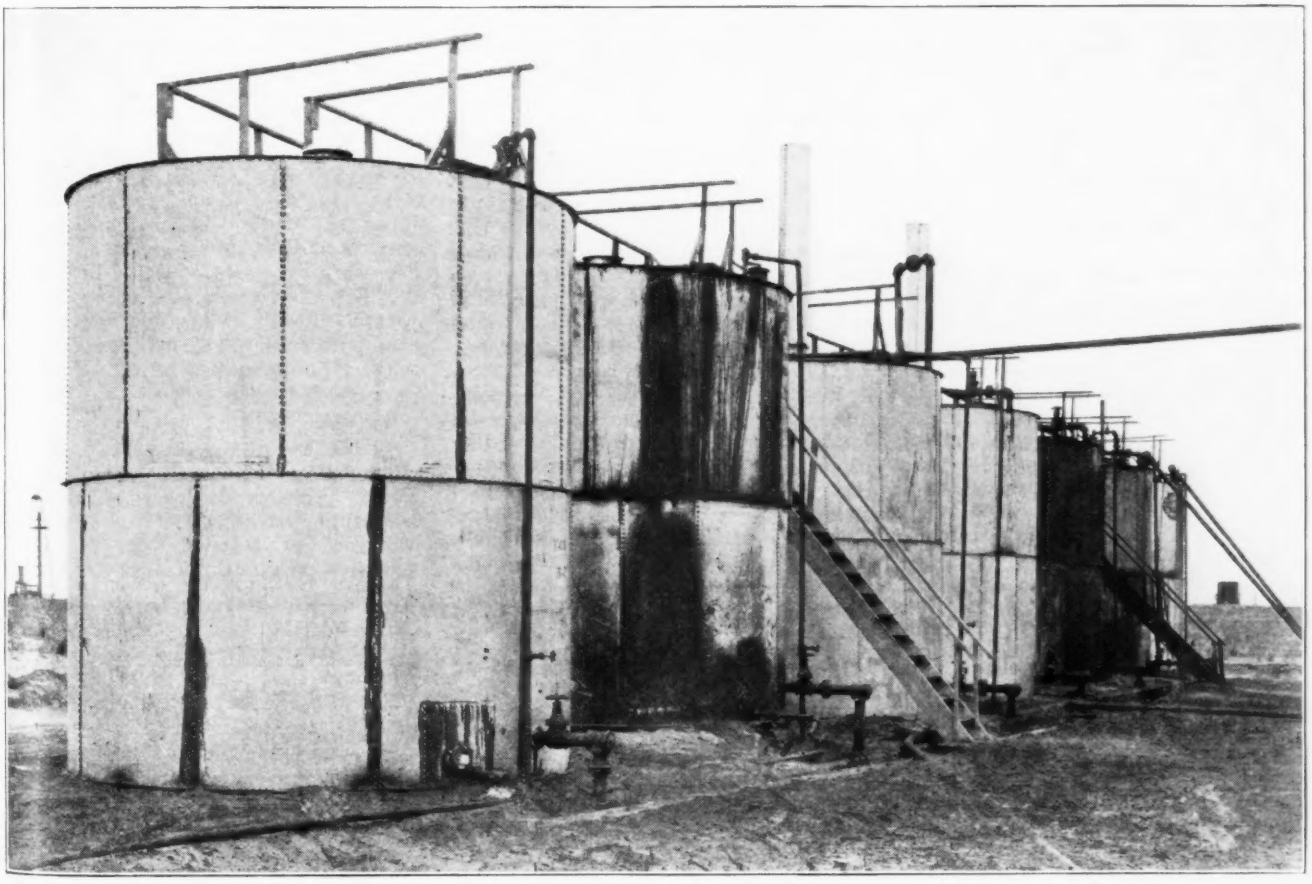
Aluminum tubing has been used with considerable success in the production of sulfur. The tubing used in sulfur wells is subject to extremely severe corrosive conditions, since it is exposed to water of fairly high salt content, molten sulfur, hydrogen sulfide, and air at a relatively high temperature (over 250 deg. F.). Although aluminum pipe has not been successful in every case in such wells, it has given good results in many cases. This suggests that there might be some applications of aluminum to air lift operation of oil wells, although this is by no means certain.

Aluminum Flow Tanks

The results of test installations of bolted aluminum tanks for handling the flow of high sulfide wells indicate that the application of aluminum for this purpose will be quite successful.

The first thorough test of tanks of this construction was made upon the Gulf Production Co.'s State Lassiter lease in Crane county, Texas. This tank was set for test in a battery in which steel bottoms failed in from five to six months, and steel side walls below the BS level failed in from 12 to 14 months. The bottom of the aluminum tank was punctured by corrosion after 18 months' service.

The corrosion of this bottom was accelerated by the presence of a large quantity of iron sulfide formed by corrosion of a steel gaging well. However, there will always be present in such flow tanks a considerable quantity of iron sulfide from the steel well tubing and the steel flow lines. Therefore, the bottom would be expected to corrode quite rapidly. As a matter of fact, the life of the bottom of this lease tank was greater than had been anticipated.



Battery of 500-barrel tanks on the State-Lassiter lease of Gulf Production Co., Crane county, Texas. At extreme left is all aluminum tank, and the composite aluminum-steel tank on the extreme right

Corrosion of bottoms of flow tanks is not particularly serious in any case, since there are available many satisfactory methods for its prevention. The most important result of the test of this lease tank lies in the fact that the side walls and deck showed no measurable penetration by corrosion after 18 months of service. The side walls, below the BS level, had been etched by the corrosive brine, but there was no actual penetration of the metal. A further test of aluminum lease tanks is at present being conducted at Borger by the U. S. Bureau of Mines under the joint auspices of the Gulf Production Corp., the Aluminum Co. of America, and the Parkersburg Rig and Reel Co. The results of this test will be of great interest.

These aluminum tanks are constructed largely of an aluminum alloy, containing approximately 1.25 per cent manganese. Duralumin (Aluminum Co. of America's alloy 17S) is used for the bolts and for strong structural members. The cost is only about twice that of a steel tank of similar design. At this ratio of cost, it seems fairly obvious that longer life of the aluminum tanks will justify the added investment under severe corrosive conditions. It is not certain that they will give equally good results in every case, but it seems certain that aluminum will find a wide application in the construction of such tanks.

The success of aluminum in this case suggests a number of other possible applications. Thus, it might be satisfactorily employed for the construction of gas separators which are exposed to very corrosive well fluids and gases. We have also experienced some difficulty from corrosion of electrical dehydrators, and it seems possible that aluminum might well be applied for this purpose. At the present state of our knowledge of the corrosion resistance of aluminum, it seems justifiable to consider aluminum as a possible material for use under any condition where resistance to well fluids, after they have left the well, is important. Any application of this nature should involve suitable precautions against dirt, iron sulfide, electrical contact with other metals, etc.

Natural Gasoline Plants

As stated above, aluminum is highly resistant to corrosion by sulfide bearing gases. This resistance has led to the successful application of aluminum in casinghead gasoline plants handling gases of very high hydrogen sulfide content. Exact details of these installations are not available, but all information which can be obtained indicates that the aluminum equipment is giving excellent service.

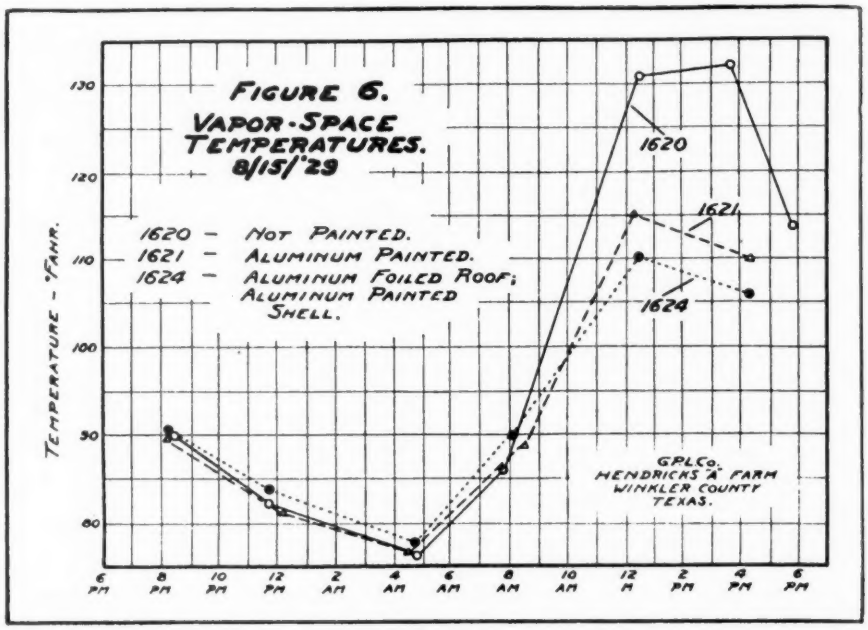


Figure 6—Showing reduction of temperature of tank vapor space where aluminum foil coating was used on exterior of crude storage tank of the Gulf Pipe Line Co. in Winkler County, Texas. Chart shows results on three tanks, one unpainted, one coated entirely with aluminum paint and one with an aluminum foil coated deck and aluminum painted sides

This would be expected from the general properties of aluminum and aluminum alloys. The most successful applications would probably be to heat exchanges, to gas lines handling corrosive gas, to absorbers and condensers, etc.

Use of Aluminum in Large Storage Tanks

The corrosion of large tanks in which high sulfide crude oil or refined products are stored or handled causes very great losses. The excellent corrosion resistance of aluminum to sulfide-bearing gases makes it particularly applicable for combating this corrosion. Due to the high cost, however, it is not feasible to use aluminum for the construction of a solid roof designed along the lines of the usual steel roof. Such an aluminum roof would cost four or five times as much as a steel roof. It is questionable if normal tank corrosion conditions can ever warrant this expenditure, especially since less costly methods of defeating this corrosion are available.

Light gage aluminum has proved its value as a sheathing over wooden decks of tanks handling highly corrosive crudes. On a tank of the Gulf Pipe Line Co. where this procedure was used, the 26-gage aluminum sheathing showed no corrosion after one year of service. Galvanized steel sheathing of the same weight had pitted very badly in less than two years. Here the first cost of the aluminum was not at all prohibitive, since the cost of the metal sheathing represented only a small part of the cost of the tank roof job. In addition to the corrosion reduction, the aluminum sheathing may be expected to effect an appreciable reduction of evaporation losses.

Aluminum alloys are widely used for various small items of tank equipment. In West Texas, nails made of duralumin are widely employed in the construction of wooden tank decks. The working parts of tank breathers and flame arrestors are cast of aluminum alloys. Floats and chains for automatic tank gages are being fabricated of aluminum. In all of these applications quite successful results are being obtained.

By the use of aluminum foil, which will be discussed in some detail later, it will probably be possible to take much fuller advantage of the corrosion resistance of aluminum in the construction of tanks.

Use of Aluminum in Oil Refineries

In refineries there exist certain conditions under which the use of solid aluminum tank decks will be justifiable. Extremely severe corrosion is experienced on run-down tanks when refining some oils of high sulfur content. Aluminum has demonstrated excellent corrosion resistance under these conditions. Where the corrosion is extremely severe, it is possible that the cost of solid aluminum decks will be justified by the savings possible. Actual installations of this type have

been made, and from all available information appear to be giving very good service. The fact that such costly installation can be justified only by exceptionally severe corrosive conditions must be emphasized.

Due to the high temperature and pressure which are dealt with in modern refinery operation, the uses of aluminum and aluminum alloys in still equipment are distinctly limited. Wilson and Bahlke found that aluminum possessed an excellent resistance to corrosion under certain pressure still conditions. These data, however, are not particularly significant in view of the high temperatures and pressures mentioned above. It is possible that aluminum linings might find some use in still construction.

Another factor which mitigates against the use of aluminum in refineries is the presence in many portions of the equipment of more or less hydrochloric acid. This makes dubious the success of aluminum in many possible refinery applications such as bubble towers, condensers for crude stills, etc. Neutralization of the hydrochloric acid by ammonia will not reduce this corrosion; neutralization by caustic soda might be successful, provided the caustic could be kept from coming into contact with the aluminum.

It seems probable, therefore, that the main applications of aluminum and aluminum alloys in refinery practice will be confined to various small pieces of equipment which are not subjected to extremely high temperatures or pressures, but which are rather rapidly corroded. Examples of such applications are small transfer lines, the covers of lockboxes, etc.

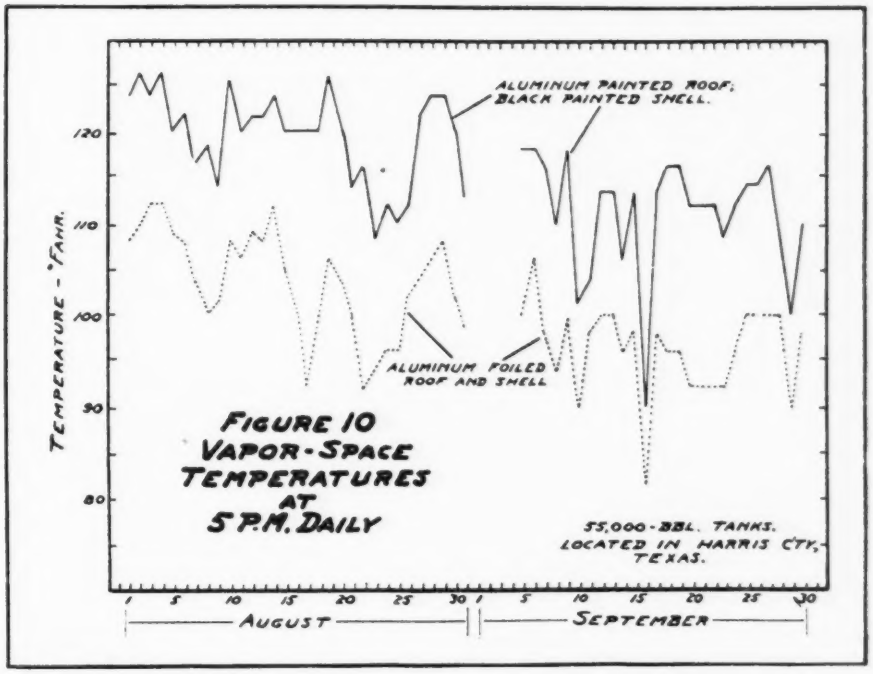


Figure 10—*Vapor space temperature readings at* 5 *P.M. during August and September on two* 55,000*-barrel tanks. One was coated entirely with aluminum foil and the other an aluminum painted roof and black shell*

Use of Aluminum Foil

Recently developed processes for the application of aluminum foil promise to make possible a very great extension of the use of aluminum in the oil industry. The development of these processes is largely due to the efforts of S. U. McGary and Walter F. Rogers of the Gulf Pipe Line Co. research department. Although the method is still very much in the experimental stage, it has already been demonstrated conclusively that it possesses great value for a number of purposes.

The essential feature of the application of aluminum foil as a protective coating by this method is in the selection of a suitable adhesive material which will hold it tightly to the surface to be protected. The requirements for successful adhesives are extremely rigid, and only two or three out of the large number which have been submitted to us since we have been experimenting with the process have proved entirely satisfactory.

With an adhesive of suitable properties, the application of the foil is surprisingly simple. It is not damaged by rough handling, and can be worked over and into irregularities of the surface with little trouble. The only important requirements in the application are that the adhesive should possess the proper degree of tackiness and stickiness, and that all air bubbles should be forced from beneath the foil during application. The impossibility of sticking the foil over air bubbles will cause them to form somewhat unsightly blisters. These blisters, unless extremely large, will not seriously interfere with the

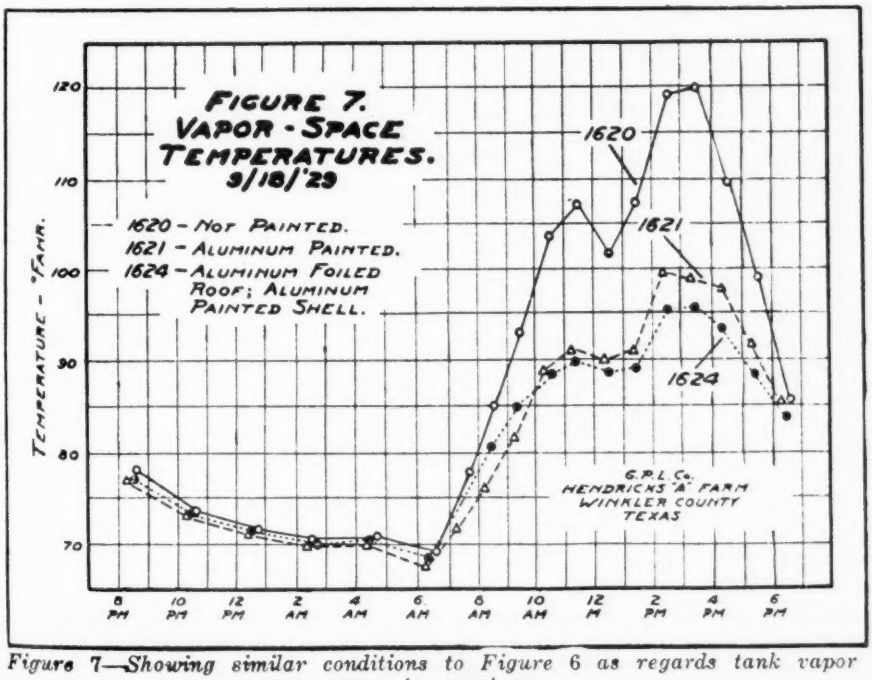


Figure 7—*Showing similar conditions to Figure* 6 *as regards tank vapor space temperature*

Carl A. Young, of the Dallas institute office, holds two important offices with that organization. He is director of its general standardization program and also executive secretary of the division of development and production engineering

protection afforded by the coating.

Aside from the simple precautions which are necessary to overcome this condition, the application does not require any particular care or skill. An idea of the labor requirement may be gained from the fact that the roof of an 80,000-barrel tank can be completely coated with foil by using 12 man-days of labor. Even this figure can probably be reduced by certain slight changes in method of application.

Foil from .0015 inch to .005 inch thick has been successfully applied by this method. Generally speaking, foil as thin as .002 inch is somewhat fragile for any service where it will be subjected to severe mechanical usage. The use of foil of this weight will probably be confined to the sides of tanks, or to other surfaces upon which appearance or reflectivity are the only results desired. Foil .003 inch thick is heavy enough and strong enough for almost any application. Increase in thickness should, of course, increase the life; and we are using foil .005 inch thick for applications where corrosive conditions are extremely severe.

The aluminum foil coatings have already demonstrated their value as coatings for the exterior of large storage tanks. Here the reduction of evaporation losses is probably the greatest gain to be made by the use of foil. This can be demonstrated by the reduction of tank vapor space temperature accomplished by its use, which is illustrated by the curves of Figs. 6 and 7. These curves show the variation, over 24-hour periods, in vapor space temperatures of three 80,000-barrel tanks, one of which is unpainted, one of which is coated entirely with aluminum paint, and the third of which has an aluminum foil coated deck and aluminum painted sides. The test of these tanks has not yet proceeded far enough to make it possible to compare evaporation losses, but preliminary measurements indicate that the tank which has the aluminum foil coating on its deck has an evaporation rate only about one-half as great as that of the tank which is painted entirely with aluminum paint.

A similar temperature reduction is illustrated by data upon two 55,000-barrel tanks, one of which is coated entirely with aluminum foil and the second of which has an aluminum-painted roof and a black shell. Temperature readings of the gas and oil of these tanks were taken at 7 a.m. and 5 p.m. daily. This 5 p.m. gas temperature readings have been plotted in Fig. 10. For the months of August and September, the aluminum foil coated tank showed the following average reductions in temperatures over the other tank.

Average difference in gas temperatures 7 a.m., 6.2 deg. F.

Average difference in oil temperatures 7 a.m., 5.0 deg. F.

Average difference in gas temperatures 5 p.m., 13.3 deg. F.

Average difference in oil temperatures 5 p.m., 4.6 deg. F.

It seems logical to anticipate a much greater life from these aluminum foil tank coatings than is obtained from the paint coatings. This may be illustrated by a comparison of the foil coatings with an aluminum paint film. The great durability of aluminum paint films is generally recognized, as is also the fact that this durability is to be attributed to a thin film of aluminum which is formed by the "leafing" of the flakes of aluminum powder. This film of aluminum is only a few ten-thousandths of an inch in thickness. Even the thinnest aluminum foil coating which can be successfully applied will give a much greater protection than such a thin film. There seems to be little reason to fear rapid deterioration of the adhesive. Materials of a nature similar to that of the adhesives employed for foiling possess excellent durability when used in other ways. When used to cement foil, they are protected against air and sunlight, which are

in most other applications responsible for their disintegration.

The same factors which make the foil coating so successful for large storage tanks have led to its use as a coating for tank cars. Here, where valuable refined products are handled, the reduction of evaporation losses will be even more important than in the case of most storage tanks. In addition to the durability and the reduction of evaporation, the striking appearance of foil coated tank cars is a reason in favor of the method. The same three reasons would seem to make the foil coating particularly applicable for use upon bulk storage tanks handling refined products.

The foil coatings were originally developed with the intention of applying them on the insides of tanks which are exposed to severe sulfide corrosion. Actual application of foil for this purpose has been held up by the difficulty of obtaining an oilproof material of suitable adhesive properties. In small scale experiments on tank interiors, in which the foil was applied with an adhesive which was not oilproof, a life more than twice as great as that of the best paint coatings was obtained.

However, such a method of application is not practical for actual protective jobs, due to the danger of slight punctures of the foil. We have recently found two adhesives which are extremely oilproof and which possess fair adhesive properties. We are proceeding with large scale test applications using these adhesives, and hope to have results from which we can estimate their value within the next few months.

Another type of application which is purely experimental is the use of aluminum foil for the protection of pipe lines. It seems certain that the foil will protect any pipe line coating material against destruction by soil stress effects. However, there is an unanswered question as to the durability of such coatings. Aluminum, although it is resistant to soil corrosion under most conditions, is quite rapidly corroded in some soils. It is possible that, even where it is corroded, it will serve to protect the underlying coating for a considerable length of time. We have applied tests to pipe lines over all types of coatings, both in soils which will corrode the aluminum rapidly and in soils against which it will probably have a great resistance. The use of foil on pipe lines must be regarded at the present time as a pure experiment, and we do not feel that any prediction of the probable outcome of this experiment is possible at the present time.

Interesting applications of foil applied by these methods are already being made in a number of industries. The process is so new that its true value cannot be estimated, but it seems certain that it will make economical the use of aluminum under many conditions for which considerations of cost have previously made it inapplicable.

Pipe Line Corrosion and Protective Methods Are Discussed

CHICAGO

THE question of the advisability of a coating for an underground pipe line must be considered in the light of the corrosive nature of the soil in which the line is buried, the probable life of the bare line, and the cost of the protective covering, Charles Fitzgerald, of the Pure Oil Pipe Line Co., Dallas brought out in a paper presented before a group session on corrosion of equipment at the institute meeting.

"The economic side of the problem is not so complicated as is generally assumed," said Mr. Fitzgerald. "No coating should be used where the soil is non-corrosive. No coating, at whatever cost, should be applied where it is not likely to provide protection for more than a few months.

"At points known to be extremely corrosive, such as spindle Top Gulley, where the pipe itself may be penetrated in three years or less, the protection should consist of the very best method in existence."

Stating that simple pipe coatings are yet in the development stage, Mr. Fitzgerald suggested that their application must be looked upon as an experiment by companies laying pipe lines. He suggested that companies apply coatings to short lengths of line until their success was determined and that the application be made on a new line rather than a reconditioned line. By simple coatings Mr. Fitzgerald referred to cold paints, enamels, asphalts and coal tar residues, emulsified asphalts, greases and similar applications not protected by a substantial wrapping material.

"Coatings of this general classification have little or no protective value for buried pipe lines," he stated. "Several competent observers, after examining hundreds of examples throughout the country, have failed to report a single case of even a thick unwrapped coating providing protection for as long as two years in a soil that has a record of bare pipe corrosion or coating failure. Many examples of coating failure in from three to six months have been observed, frequently in mildly corrosive soil."

In general the loss caused by corrosion of underground pipe lines is not as large as has been assumed, Mr. Fitzgerald pointed out. Without doubt it is less per year, throughout the length of life of an average line, than the cost, divided by the effective life in years, of any of the simple coatings which have been extensively applied, he stated.

On a line between Corsicana and Beaumont, containing 316 miles of 8-inch pipe, only 2043 feet, or one-eighth of one per cent, has been replaced in eight years, he stated. Much of this replacement was in one active hot spot, he said. On another bare line between Glenn Pool and Port Arthur, containing over 1000 miles of six and eight-inch line, slightly over one and a half per cent had been replaced in 23 years. These lines were not special cases, said Mr. Fitzgerald, but were taken as examples because their pipe replacement records were available.

A serious objection to the simple coatings, he stated, was their tendency to flow from one spot to another on the pipe surface, or to move entirely off it. This is called "soil stress effect." It is caused principally by the forces set up by alternate slow wetting and drying of the soil, or by

uneven pressure exerted by the backfill on the coating.

The damage caused by soil stress effect may be reduced by the use of one or more layers of a protective covering, chosen more for resistance to mechanical penetration than for chemical inactivity. Mr. Fitzgerald said it was indicated that the useful life of a simple coating was materially increased by an added protection of this type, which may consist of pipe line felt, wood veneer, thin sheet iron aluminum foil, or other similar substances.

CAUSES of pipe line currents and the relation between discharge of current and corrosion of the line has been the basis of a study carried on in connection with the U. S. Bureau of Standards work on soil corrosion.

The status of this work was reported on at the institute session on corrosion of equipment in a paper prepared by K. H. Logan, in charge of the Bureau of Standards investigation, and Walter Rogers, of the Gulf Pipe Line Co., at Houston, and J. F. Putnam, of the Standard Oil Co. of California, San Francisco.

Data on measurement of currents and line corrosion were secured from a study of one of the Marland Oil Co.'s lines, also from electrical measurements made on a line of the Standard Oil Co. of California. While the data so far secured cannot be considered as positively determining the cause of pipe line currents, several possible causes are suggested and the authors include that the current which may be found on any line must be considered as the result or summation of currents from several sources.

With regard to practical significance of the data the authors have the following to say:

"Reviewing the data presented, we find that in two instances there appears to be a rather close relation between discharge of current and corrosion. Other cases have been found where no such relation was apparent. The latter cases may be explained by assuming that not all corrosion is accompanied by the flow of current over sufficient distances to permit its measurement by the methods employed; and that, where discharge of current was found without corrosion, either the discharge had not continued long enough to produce noticeable corrosion, or that corrosion may have existed unobserved.

"If we assume that the current is the result of chemical action of soil solutions on the pipe, we know that the action can be reduced by preventing the current flow, since the anode of a galvanic cell corrodes only slowly, if at all, when the cell is on open circuit. If we assume that the currents do not originate at the surface of the pipe line, but are the result of pumping operations, earth potentials or galvanic cells independent of the line, then the ordinary laws of electrolysis should hold.

"In either case, reduction of the current on the line will reduce the corrosion associated with or caused by the current.

"Examination of the data will show that the current on a single line is small, the maximum observed current being less than 5 amperes. The total current flowing to or from a pumping station may, however, be of considerable magnitude.

"The importance of pipe line currents has not been determined with sufficient definiteness to justify any considerable expense in their elimination; but insofar as they can be reduced without appreciable additional expense, that reduction seems advisable. The means of reducing the currents are two: reduction of the conductivity of lines by the use of high resistance metal and insulating joints, and the surface insulation of the line by non-conductive protective coatings."

Field Inspection of Coatings

THAT the practice of applying protective coatings to oil and gas lines is still in such an experimental state that conclusive data as to results with various types of coatings is not at hand, was also brought out at this institute session by Gordon N. Scott, research engineer for the American Petroleum Institute assisting in the Bureau of Standards study of soil corrosion.

Mr. Scott reported the results of 449 field inspections of protective coatings applied to operating lines of various oil and gas companies, the purpose of the inspection being to determine the condition of coatings now in use on pipe lines.

His summary of the work so far done brought out what other speakers had gone into, namely that the extent to which the soil was corrosive was an important factor in any study of the performance of protective coatings, also the age of the coating on the pipe and the manner in which it had been applied.

"The speed with which simple protective coatings break down to a point where corrosion starts is so great that it cannot be expected that repairs and replacements will be eliminated by the use of these coatings in highly corrosive soils," stated Mr. Scott. "The use of such coatings may postpone the normal time and extent of repairs and replacements more than sufficiently to justify economically the application of the coating, but prolonged freedom from trouble on the line cannot be anticipated."

Mr. Scott concurred with other speakers on this subject that the combined experience of operating companies has been that a very small portion of all pipe lines lie in highly corrosive soil. With regard to an ideal coating he stated:

"Without regard to chemical stability or moisture impermeability, the ideal coating must have certain fundamental mechanical properties. Most failures of coatings to prevent corrosion of the pipe are due to some form of soil action. Ordinarily, unreinforced cold or hot applications lack sufficient mechanical strength to resist this soil action.

"Both coal tar and asphalt base materials have been filled with finely divided mineral fillers, resulting in harder materials known as 'enamels.' The filler supplies a part of the mechanical deficiency of the base materials.

"The virtue of fabrics does not lie in their ability to prevent the infiltration of corrosive agents to the pipe, but in the strength or partial solidity which they afford a coating to resist mechanical distortion. Wrapped coatings are subject to a redistribution of the coating material around the pipe immediately after the trench is backfilled, but they have the property of lengthening the time in which the coating is reduced in thickness to a point where corrosion may occur. The greater the number of wraps incorporated in a given treatment, the greater the possibility of increasing the time before the coating is dangerously reduced in thickness. * * *

"The ideal coating would be one which had sufficient mechanical strengh to resist any material reduction in thickness and remain uniformly distributed around the pipe, irrespective of any distorting action of the soil. This should, of course, go hand in hand with a suitable bond to the metal and sufficient elasticity to provide for whatever expansion or contraction may occur in the pipe. Such an ideally simple coating is not at present available. Mastics, or highly filled bituminous materials, offer the possibility of satisfying the requirements of the ideal coating; but before such may become universally

applicable, cost must be within reason and application practical."

Soil Corrosion Study Report

IN A few years it will be possible, after the proper examination of a locality, to predict roughly the life of an underground pipe in that place as far as the effect upon it of soil corrosion is concerned.

H. K. Logan, in charge of the Bureau of Standards soil corrosion investigation, made this statement in the course of a report to the same institute group session on the progress of the investigation.

This work started in 1922, with one man assigned to the task, and in 1929 five men were employed by the Bureau of Standards and in addition it directs the work of three research associates. About 125 organizations are cooperating in one way or another in this research, said Mr. Logan.

Work carried on in 1929 also included the metallurgical aspects of the problem of determining causes of corrosion and developing less corrodible pipe; study of behavior of protective coatings, including determination of the physical and chemical causes of coating failure and the development of methods of testing coatings.

Another part of the work given attention this year is the correlation of corrosion on working pipe lines with soil conditions. Studies of one or more lines belonging to five organizations have been made. Mr. Logan reported that it appeared that, in addition to stray current from electric railways and local soil action two other phenomena sometimes cause corrosion of underground pipe lines. One is the galvanic action resulting when the pipe passes through different soil conditions, or when the line is connected to buried or partially buried structures of different composition. The other is electrolysis by electric currents originating either in pump station operation or in geophysical phenomena.

Methods in Use to Combat Corrosion In Pressure Stills

By Walter G. Whitman* and J. K. Roberts*

(Presented before American Petroleum Institute, Chicago, Dec. 3 to 5)

PERHAPS the most serious corrosion problem existing in refinery operation at the present time is that occurring in cracking equipment. The high temperatures employed greatly increase the corrosion rates, and the use of high pressures makes it imperative from a safety standpoint to protect equipment against the reduction of strength by corrosion.

The advent of pressure stilling introduced the problem of combating corrosion due to hydrogen sulfide at elevated temperatures. Improvements in the technique of cracking, such as the use of more extreme pressures and temperatures and pipe still heating with accompanying higher velocities, increased the seriousness of the problem, both because of greater specific rates and because increased investment charges and increased capacities result in larger penalties due to shutdowns and replacements. The present refining of high sulfur crudes has further intensified the difficulty, until it looms as a major item in pressure still design and operation.

Refiners, manufacturers of equipment, and metallurgists specializing in corrosion and heat resisting alloys have all contributed to the progress in reducing corrosion which has been made during the past few years.

The General Committee on Corrosion of the American Petroleum Institute is endeavoring to collect and disseminate the available information on methods which have proved successful or indicate promise. It is the purpose of this paper to describe in a more general way some of the preventive measures which are being employed. In doing this, the factors affecting corrosion in pressure stills will be discussed in order to lay a foundation for the discussion of combative measures. Much of the information contained in this paper has been accumulated through the efforts of the institute's corrosion committee and its individual members.

*Standard Oil Co. (Indiana).

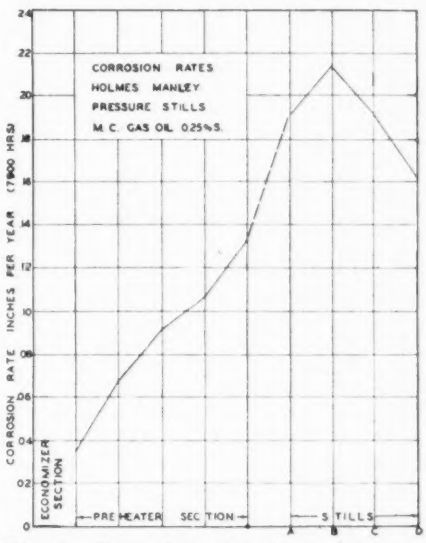


Fig. 1—Corrosion rates in various sections of a Holmes-Manley pressure still running mainly on stock from Mid-Continent crude

The intensity of pressure still corrosion may be perceived from the specific rates of penetration experienced. An average penetration rate on steel of one-fifth of an inch per year with no preventive treatment is commonly encountered with stocks which would be classed as relatively non-corrosive. Stocks from sour West Texas crudes may cause corrosion rates well in excess of one inch per year in some parts of the equipment. With these very rapid rates of corrosion, expensive preventive methods are often justified.

In deciding to what extent corrosion preventive measures should be employed, all of the economic factors should be carefully balanced. Most obvious, of course, is the cost of replacement of materials and labor of installation. Second, the annual investment charges to be made against a cracking unit are increased by the necessity of shutting down the equipment for replacements.

Even more important may be the loss of profits occasioned by shutting down cracking capacity in refineries

which do not have excess cracking facilities, or which must utilize older and less efficient units to maintain capacity. Finally, there are the intangible items of safety and morale to be considered, as well as the necessity for more frequent and elaborate inspections when corrosion preventive measures are not employed.

Factors Affecting Corrosion

The corrosion encountered in cracking equipment is due to hydrogen sulfide present in the charging stock or formed during cracking. The direct reaction of hydrogen sulfide with iron at low temperatures is extremely slow in the absence of liquid water, but at high temperatures this direct reaction becomes quite rapid. Two fundamental factors affecting the rate of corrosion of iron by hydrogen sulfide are the temperature and the concentration, i.e., partial pressure, at the reacting surface. The change in rate of reaction with increasing temperature is quite rapid, and is indicated as doubling with each increase of 25 deg. to 30 deg. F. in temperature.

The factors affecting the concentration of hydrogen sulfide at the reacting surface are numerous. Obviously the quantity of hydrogen sulfide originally present in the charging stock or formed during cracking is the first contributing factor. Second, the total pressure on the system directly affects the partial pressure of the hydrogen sulfide of given volume per cent. Third, the velocity and turbulence of the oil and vapors is of major importance, both because they affect the conduction or diffusion of hydrogen sulfide to the reacting surface, and because these factors may prevent the formation of, or eliminate by erosion, a protective coating of coke or corrosion product. Fourth, protective coatings, either artificial or formed by corrosion or cracking to coke, may greatly reduce the rate of corrosion by isolating the corroding surface.

In Fig. 1 are shown the corrosion rates in various sections of a Holmes-Manley pressure still running mainly on stock from Mid-Continent crude.

In Fig. 2 a plot is given of the corrosion rates in various part of a Cross pressure still operated on stock from Winkler and Mexia crudes. The data for the Cross unit were furnished by The Pure Oil Co. These data indicate clearly the effect of increasing temperature and cracking and decreasing turbulence on corrosion. As the temperature increases through the tube still, the corrosion rate increases rapidly. In the Cross unit, when the velocity and turbulence are decreased and coke deposition increases in the soaking drum, however, even with a greater amount of hydrogen sulfide formed by cracking and a temperature only slightly lower, the corrosion rate decreases rapidly.

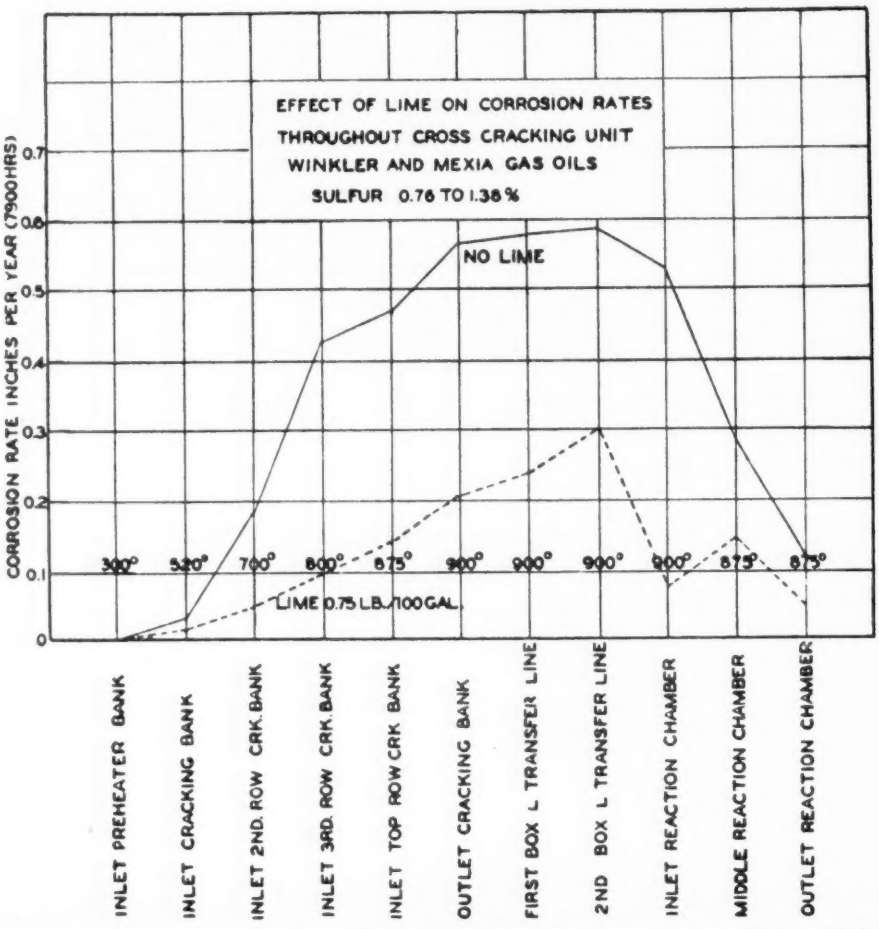


Fig. 2—Corrosion rates in various parts of a Cross pressure still operated on stock from Winkler and Mexia crudes

Methods of Combating Corrosion

Numerous methods of combating corrosion have been tried for various parts of pressure still equipment. Probably the most common is the use of metal walls in excess of the thickness required for strength, allowing the metal to corrode away until the minimum allowable thickness is reached.

This procedure is generally adopted in design at the present time, and has met with success in certain cases where the corrosion rate is low. With severe corrosion, however, it is not practicable to make sufficient allowance to withstand corrosion over a long period of time. Further, the difficulties of manufacture and handling, as well as increased cost, may become excessive, and in some cases heat transmission through thick walls as affecting metal temperature becomes a limiting factor. Careful periodic drillings and inspection for pitting or non-uniform corrosion are, of course, necessary to insure safe operation and determine the time for replacement.

Three general methods of decreasing corrosion are: reducing the corrosiveness of the charging stock, increasing the resistance of the metals, and isolating the metal from the corrosive stock by linings, by the use of plated metals, or by protective coatings.

The corrosiveness of the charging stock may be greatly reduced by employing some agent which will react readily with the hydrogen sulfide. One measure which has met with excellent success in many cases is the use of lime added to the feed before it enters the system. Table I gives the results of a series of tests made on a Holmes-Manley pressure still before and after the addition of lime. In this case, the total sufur content of the charging stock was 0.25 per cent, and approximately 1.0 pound of hydrated lime was added per 100 gallons of cold feed. As will be noted from the table, the corrosion in various parts of the equipment was reduced by from 80 per cent to 97 per cent. Similar results have been obtained in Cross and

Dubbs cracking units, although in some cases the protection has not been as complete as here indicated.

Table I

Effect of Addition of Lime, 1 Lb. Hydrate per 100 Gal. Feed

	Corrosion Rates—In. Per Year		
	Before Lime	After Lime	Protection Per cent
Stills—vapor space	0.192	0.0217	89
Stills—liquid space	0.146	0.0073	95
Preheater outlet	0.131	0.003	97
Bubble tower bottom.....	0.141	0.028	80

The quantity of sulfur in the charging stock which will produce hydrogen sulfide determines the amount of lime required for efficient protection. In Fig. 3 is shown the corrosion rate in the vapor space of "D" still of a Holmes-Manley unit during a period in which the sulfur content of the charging stock was increased from 0.25 per cent to 0.5 per cent. The initially high corrosion rate as indicated in the vapor space of the stills was decreased from 0.192 in. per year to 0.0217 in. per year, as indicated in Table I. As the sulfur increased, the corrosion rate went up until a rate of 0.071 in. per year was reached. Upon doubling the lime feed, the corrosion rate was again reduced to a low value.

The reduction in corrosion caused by lime is paralleled by the lowered content of hydrogen sulfide in the gas from the stills. Thus before lime was used, the dry gas contained 150 grains hydrogen sulfide per 100 cu. ft. Immediately after lime was started, this dropped to 20 grains, gradually increasing to 50-75 grains, as the sulfur went up in the charge, and dropping back to 20 grains when the lime feed was doubled.

The corrosiveness of a charging stock is not measured alone by its sulfur content. Fig. 4 gives data from The Pure Oil Company showing the effect of various quantities of lime on the corrosiveness of two stocks, one a virgin stock containing 1.1 per cent of total sulfur, the other a cycle stock containing 0.93 per cent of sulfur. In the case of the virgin stock 1.7 pound of lime per 100 gallons of feed gave a corrosion rate of 0.62 in. per year, while for the recycle stock 0.75 pound of lime per 100 gallons of feed gave a corrosion rate of 0.016, with only slightly less sulfur in the stock.

These data indicate the necessity of plant scale experiments to determine the optimum quantity of lime to use. There are some data to indicate that the corrosiveness of a mixture of stocks may actually be less than the average calculated from the corrosiveness of the individual stocks. This fact suggests the possibility of decreasing corrosion by the proper selection of virgin and cycle charging stocks.

—*Underwood & Underwood*

Dr. R. P. Anderson, refinery technologist for the institute. He serves as a liason officer between the institute and technical organizations in other industries

Reports from various companies which have used lime show that concentrations from 0.1 to as high as 10 pounds per barrel have been employed on a plant scale. In general, however, the average amount used is in the neighborhood of 1 to 2 pounds of hydrate per 100 gallons of cold feed.

The ultimate disposition of the lime fed to a Holmes-Manley unit is about one-third in the coke and two-thirds in the tar. Evidently the presence of so much lime in the tar may make it unsalable for certain purposes, thus introducing the problem of removing it by filtration or other means. In some cases, this problem has been regarded as sufficiently serious to preclude the use of lime entirely, although several refineries have achieved a successful solution.

Caustic soda instead of lime may have some advantages, but appears to cause the formation of a very dense coke difficult to remove and introduces the hazard of caustic embrittlement of the steel. Ammonia does not reduce hydrogen sulfide corrosion of this type. A point of superiority in the use of lime over that of resistant alloys is that lime protects the entire system by reducing hydrogen sulfide.

When resistant metals are used, only that part of the equipment in which the alloys are employed is protected, and the corrosion is even somewhat intensified in other parts of the system. In this connection, it should be pointed out that when the overhead stock may crack further in another part of the system out of contact with lime, such as in the base of a Holmes-Manley bubble tower, the protection is not so complete at these points. In such cases, resistant liners are being used.

A second means of reducing corrosion in pressure still equipment is the use of resistant metals. The chromium-iron and chromium-nickel-iron alloys appear to offer the most promise for this type of service. Because of their high cost in comparison to steel, the use of such alloys is justified only where the safe life of the part under consideration is short. The physical properties of these alloys are often a determining factor in their use.

From the standpoint of complete resistance to corrosion in pressure stills and excellent physical properties, alloys of the class of 18 per cent chromium-8 per cent nickel are best. However, they cost approximately ten times as much as ordinary steel; consequently only in extremely corrosive conditions is their use justified. Because of their superior physical properties at elevated temperatures, they may often be economically used for the hottest tubes in the preheater, where both heat resistance and corrosion resistance are necessary.

In this service, however, some difficulty has been encountered through the use of steel header boxes, due to the difference in coefficient of expansion which causes the tubes to become loose in the headers and to leak when the unit is brought up. If alloy header boxes should be required, the expense of alloy tubes would be about doubled. Recent experience along this line indicates, however, that alloy boxes may be unnecessary. At present the 18-8 chrome nickel alloy is regarded as the only proven material for tubes under pressure with extreme temperature and corrosive conditions.

The 16 per cent to 18 per cent chromium iron alloy without nickel, while quite resistant to corrosion, embrittles seriously when exposed to prolonged heating above 800 deg. F. This fact was not discovered until several tube installations had been made, although fortunately the tubes were removed before any serious accidents occurred. At present, the 16-18 chrome is considered quite unsatisfactory as tube material, although for valve trim, liners not requiring strength and such uses, it may be successfully employed. The 12-14 per cent chrome alloy is somewhat less resistant, but is claimed to be free from embrittlement. It finds extensive use as valve trim.

Perhaps of greatest potential importance from an economic standpoint is the 4-6 per cent chromium alloy. This metal, although costing only twice as much as steel, has from four to ten times the corrosion resistance in pressure stills. The physical properties of the low chrome alloy are reported to be nearly the same as for mild steel, and the resistance to scaling to be slightly better than for steel. The following table gives corrosion rates on the 4-6 per cent chromium alloy compared to steel.

	Corrosion Rate—In. Per Year		
	Holmes-Manley "D" Still Vapor Space	Bottom of Holmes-Manley Bubble Tower	Outlet Tube of Cross Furnace (Pure Oil)
4-6 per cent chromium alloy	0.0014	0.0018	0.027
Still bottom steel	0.0098	0.0165	0.127

The use of metal coatings has been the subject of extended research dur-

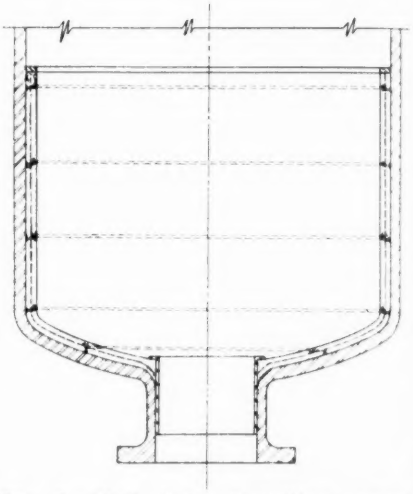


Fig. 5—Method for installing cement lining in the bottom of a bubble tower

ing the past several years. Calorized tubes were at one time thought to offer great promise for corrosion resistance in pressure stills because of the well-known resistance of aluminum to corrosion by hydrogen sulfide. This product became discredited, however, when experience showed that pitting occurred at many points inside the tubes where the calorizing was imperfect. Some instances have been reported recently where calorized tubes are giving reasonable satisfaction.

A recent survey of the experience of a number of refineries by the Institute's corrosion committee indicates that chromium plating has given rather disappointing results. Chromium itself is quite free from attack, but the operation of plating steel with chromium so that no pinholes are left has not been perfected. For small parts such as thermocouple wells success has been reported, but for tubes

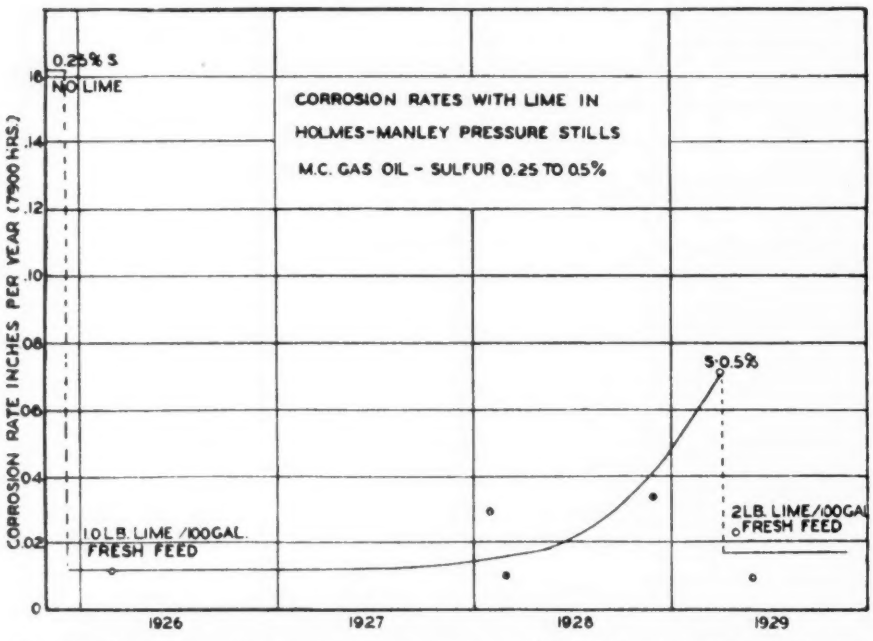


Fig. 3—Corrosion rate in the vapor space of "D" still of a Holmes-Manley unit during a period in which the sulfur content of the charging stock was increased

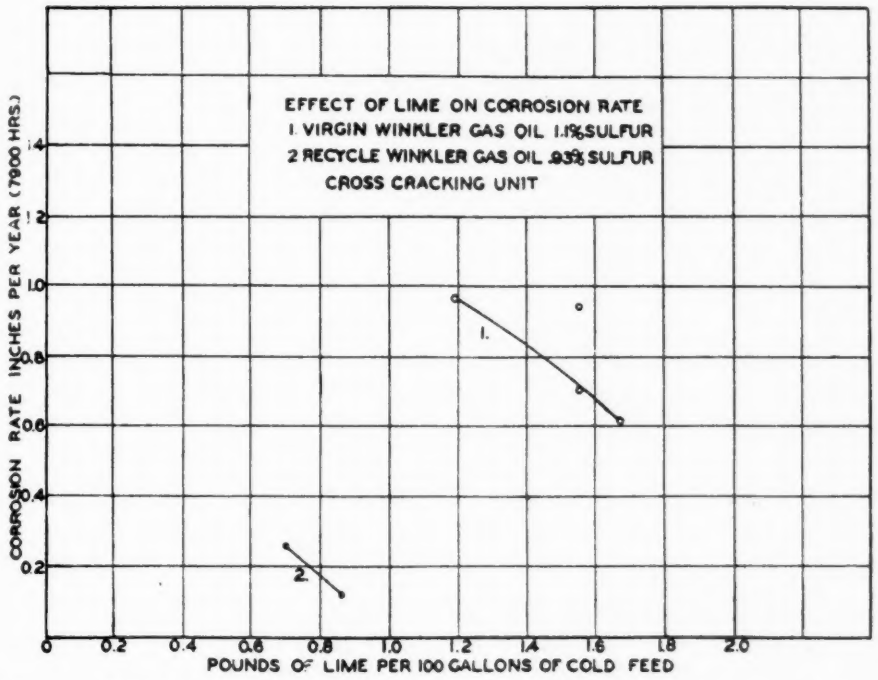


Fig. 4—Effect of various quantities of lime on the corrosiveness of two charging stocks

and other large equipment chromium plate must still be considered as in the experimental stage.

More recently the use of cement and refractory linings for unfired parts of pressure still equipment has come to the fore. For large vessels this type of protective coating is an economical and satisfactory method of eliminating corrosion, although care in installation is very necessary. Among the types of linings which have been successfully used are portland cement, adamant, hytempite, thermolith, and others. Most of these require reinforcing.

In Fig. 5 is shown a method of installing a cement lining in the bottom of a bubble tower. The walls are carefully cleaned by sandblasting, reinforcing wire installed as shown, and the cement applied by spraying. A fairly dry mixture of equal parts of sand and cement is used. After a preliminary set, the lining is cured with steam for 48 hours, after which it is carefully dried before the tower is returned to service. Linings of refractory cements, in general, require curing at higher temperatures.

Metal lines have been tried, but usually have not been successful because of collapsing by coke accumulations between the liner and metal walls. Equalizer lines on Holmes-Manley stills have been successfully lined with a 14 per cent chrome alloy sleeve.

It is general experience that corrosion in pressure still tubes proceeds uniformly and without marked pitting. Near the ends of the tubes, the corrosion is somewhat more severe than in the middle, presumably due to turbulence created at the entrance and exit. The magnitude of these end effects probably varies with the operating conditions, but for units such as Holmes-Manleys the end corrosion does not exceed the average by more than 50 per cent. One instance has been reported where the use of smooth flow return bends decreased this end effect markedly, and hence increased the operating life of the tube.

Unfortunately pressure still corrosion is not always uniform. Severe corrosion of vapor lines on the outside of bends and where they enter or leave stills and towers creates a condition of uncertainty necessitating constant watchfulness. Turbulence effects where safety valve or other connections come into lines cause irregular corrosion also. On a Holmes-Manley unit the backtrap lines are particularly subject to irregular corrosion. Probably these cases can all be attributed to turbulence effects and the corresponding removal or prevention of coatings of coke or corrosion product, although the results are sometimes difficult to explain in a quantitative manner.

It is quite important that frequent tests and inspections for corrosion be made. The institute's corrosion committee has been studying various methods for conducting tests, and expects to adopt and publish a standard method of testing and reporting results in the near future. This subject is discussed in the current report of the committee.

In conclusion, it appears that the most promising protective measures for pressure still corrosion are the use of lime, liners of cement, refractories, or metal, and the use of resistant alloys such as 18 per cent chrome-8 per cent nickel for parts of equipment having unduly short life. The 4-6 per cent chrome alloy, because of its relatively low cost and good resistant qualities, gives promise of wide usefulness for all types of equipment.

Adequate protective measures for pressure still equipment are still in an early stage of development, and must advance rapidly to keep pace with the present tendencies towards increased operating temperatures and the influx of sour crudes. Progress along this line can be best effected by cooperative efforts such as are being fostered by the General Committee on Corrosion of the American Petroleum Institute.

Gas Lock Tendency Shown By 10 Per Cent Point

CHICAGO—The 10 per cent point on the A.S.T.M. distillation curve gives a good indication of the vapor locking tendencies of an aviation gasoline in fuel lines and feed pumps it was reported to the refinery technology division of the Institute in a paper by C. C. Moore, Jr. and M. S. Reynolds of the Union Oil Co.

A series of experiments on various types of motor fuels were conducted by the authors in the laboratory where conditions of temperature and atmospheric pressures could be controlled.

The experiments consisted of pumping gasolines of different volatility at varying temperatures and pressures through a fuel line to simulate flying conditions.

Volumetric efficiencies of pumps were plotted against 10 per cent points, initial boiling points, average boiling points and vapor pressures.

Summarizing their results the authors said that "the gas locking tendency under conditions where locking is serious in extent, is a function of the 10 per cent point in the A. S. T. M. distillation as well as of the 'gas free' vapor pressure calculated from the 10 per cent point in the A. S. T. M. distillation. To a somewhat less extent, the initial boiling point can be relied upon for prediction of the relative gas locking tendency, but there seems to be no valid connection between vapor lock and the average boiling point."

American Petroleum Institute . . . Chicago, Dec. 3-5, '29

Acidity of Steam Refined Stock Affects Color of Finished Bright Stock

By R. D. Evans*

(*Presented before American Petroleum Institute, Chicago, Dec. 3 to 5*)

THE manufacture of bright stock by the contact process is very generally known, and is used with stocks varying through wide specifications. The steam refined stock, after acid treatment, is not neutralized before applying the decolorizing agent, as is the case in the percolating method.

To determine the effect of free acid in the treated stock with respect to the decolorizing and neutralizing value of the clay is the purpose of this series of tests. The steam refined stock was produced continuously in a battery of seven stills from an Oklahoma green crude of the following characteristics:

Gravity, deg. A.P.I.	38.5
Color, in ¼-in. Lovibond cell in 10 per cent water-white naphtha solution	100.0
Basic sediment in water	trace only

This crude produced 19 per cent steam refined stock which tested as follows:

Gravity, deg. A.P.I.	21.5
Flash, deg. F.	525
Fire, deg. F.	605
Viscosity, at 210 deg. F.	205
Pour, deg. F.	35-65
Carbon residue, per cent	4.0
Color, in ¼-in. Lovibond cell in 10 per cent water-white naphtha solution	600
Tar (Holde method), per cent	0.4

Acid treating is the next step involved in the manufacture of bright stock, and sulfuric acid is universally used. This is a source of endless trouble and expense. There are almost as many different procedures of treating as there are refineries handling acid treated stocks.

Temperature, gravity, and strength of acid, number of "dumps," quantity of oil treated, time of blowing, settling time, etc., vary as the steam refined stock varies, and the subsequent method of finishing to bright stock. Some stocks can most economically be treated with 66 Baume acid, while others react best to 98 per cent acid. In some stocks, the reaction with 98 per cent acid is so violent that the stock boils over; consequently, a water acid only can be used.

In general, with 98 per cent acid, the loss due to sludge is much greater; but a lighter colored acid treated oil can be obtained which requires less clay to make a given color. Generally, a more efficient treatment is obtained with a definite quantity of acid if the acid be applied in two or three dumps, settling after each application and drawing off the sludge before applying the next dump.

This efficiency, however, is somewhat offset by a slight increase in sludge loss; not being due mainly to more sludge produced, but largely to the steam refined stock drawn off with the sludge in performing two or more clean "draw-offs" instead of one.

Treating Temperature Important

Temperature of treating is also of prime importance; as the lower the temperature, the more decolorizing value the acid has. Also it is advisable to treat at the lowest temperature consistent with obtaining an intimate contact between the acid and oil.

There is, however, a minimum temperature for each grade of stock below which the viscosity of the oil is so great that settling is retarded (in some cases the pepper will not settle) to such an extent that part of the sludge goes back into solution, thereby losing color. This is the manner in which time is an important factor. The reaction between sulfuric acid and asphalt is not irreversible, and after a time the acid treated oil has a tendency to redissolve some of the sludge.

Every treater of heavy oils, no doubt, has experienced trouble with his treat forming a "biscuit," i.e., all or part of the sludge after settling rises to the top in a foamy mass. This conditions is usually met with in batches treated too hot, or when the sludge remains on the oil too long. It is possible that it is due to a secondary reaction with the liberation of gases forming a light foamy mass. At times, this mass will break and settle of itself; at other times, it becomes necessary to reblow. On the other hand, if the settling period is too short, the loss in drawing the sludge is larger; also in contacting, the oil requires more clay to neutralize the unsettled acid and to remove the suspended sludge and pepper.

* * *

Overblowing produces oxidation with a more difficult oil to contact; while insufficient blowing is a waste of acid in that, unless the acid is thoroughly and uniformly mixed, all the acid will not enter into the reaction. This requires more acid than is necessary; or else color is sacrificed.

Treatment Determined By Trial

From this partial list of factors, one can readily see that the optimum conditions for treating a given stock can be determined only by trial and by the experience and intelligence of the treater. The best procedure on any grade of stock is to obtain intimate contact, at the lowest consistent temperature, with removal of the sludge produced as quickly as possible.

In order to get the best results, some refineries treat their stocks in various percentage solutions of naphthas or kerosenes. There is a large amount of research being conducted along the lines of continuous treating and removing the sludge by centrifuging. This method of treating has great possibilities for more economical treatment and production of a higher grade of acid treated stock.

The amount of free acid remaining in the treated stock can be controlled to a large extent by blowing. The best procedure of doing this is to check the acidity of the treated stock in the laboratory after drawing off the sludge. If the acidity is high, then additional blowing will in most cases reduce it.

With additional blowing, the color has to be watched carefully, for it

*Independent Oil & Gas Co., Tulsa.

is possible to overblow to the point where oxidation takes place and the color begins to darken. For this reason, it is not practicable to reduce the acidity to a minimum on some batches, as the increased color will more than offset the advantage gained by a slight decrease in acidity.

The stock selected for this experiment was a sample from plant operation, treated with 98 per cent acid in two dumps: the first of 14 pounds and the second of 16 pounds. This gave a sludge loss of 30 per cent and an acid treated stock of 30 color in ¼-inch Lovibond cell in 10 per cent solution.

Results of Experiment

In each determination of 1,500 cubic centimeters of acid treated steam refined stock was used, and contacted at 500 F. with 15 pounds of pulp clay per barrel, with results as follows:

	Free Acid in Acid Stock Per Cent	Color of Finished Bright Stock	Free Acid in Bright Stock Per Cent
No. 1	0.265	⅞	Neutral
No. 2	0.370	1 7/16	0.004
No. 3	0.449	1 9/16	0.004
No. 4	0.582	½	0.003
No. 5	0.738	⅜	0.005
No. 6	1.217	¼	0.009
No. 7	1.575	¼	0.010
No. 8	1.808	Dark	0.014
No. 9	2.127	Dark	0.023

In experiments on No. 8 and 9, the contacted oil was too dark for testing on the Tag-Robinson colorimeter. No. 8, however, showed a very light green cast. No. 9 was much darker, and was beginning to show a noticeable blue cast.

To determine the effect of additional clay on stocks of the same acidity, another series of determinations was made using 20 pounds of pulp clay per barrel:

	Free Acid in Acid Stock Per Cent	Color of Finished Bright Stock	Free Acid in Bright Stock Per Cent
No. 1	0.265	1½	Neutral
No. 2	0.370	1 1/16	Neutral
No. 3	0.449	1 3/16	0.002
No. 4	0.582	1⅛	0.003
No. 5	0.738	¾	0.003
No. 7	1.575	⅞	0.002
No. 8	1.808	1 5/16	0.007
No. 9	2.127	Dark	0.016

No. 9, like No. 8 and 9 in the first series of determinations, was too dark for testing on the Tag-Robinson colorimeter. The color, however, of No. 9 of this series, using 20 pounds per barrel, very closely approximated that of No. 8 of the first series with 15 pounds per barrel.

In the tests, the acidity of the original sample (No. 1) was 0.265 per cent. To obtain the acidity shown in the other samples, the necessary amount of sulfuric acid was added. Upon the addition of acid, there was no change in color, and the determination of free acidity checked the calculated amount added within the limits of error. This check was taken to determine whether or not the acid remained as free acid or reacted with the stock.

—*Underwood & Underwood*

D. V. Stroop, research engineer with the institute, and, among other duties, chairman of its technical committee on Prevention of Pollution

Conclusion

Summarizing the above, we believe the following conclusions are justified:

1. There is a direct relationship between the acidity of the acid treated steam refined stock and the color obtained in the finished bright stock. Using a given amount of clay, the color obtained on the finished bright stock is darker as the free acidity of the acid treated steam refined stock increases.

2. The absorption value of the clay is not 100 per cent selective. It is generally believed that the clay has a selective adsorption for the acid. From the above, it appears that this is true to a limited extent. However, it will be noted from the above that a bright stock of D color, or better, can be produced and still leave a relatively large amount of free acid in the finished bright stock. The acidity of the finished bright stock will vary in proportion to the acidity of the treated steam refined stock.

3. To produce a bright stock which is neutral from a steam refined stock high in acidity, it is necessary to make a much lighter color than may be desired. For example, a neutral bright stock of ⅞ Tag-Robinson color

(*Continued on Page* 57)

Motor Vehicle Records; How to Apply Them

By J. G. Moxey*

(Presented before American Petroleum Institute, Chicago, Dec. 3-5)

CHICAGO

"IT IS quite plain that any successful accounting system must of necessity tie into some general operating unit or units. These have variously been selected for the purpose of operation, such as mile, hour, gallon, and gallon mile. In making any comparisons, allow me to caution you that the basis must be fundamentally the same, particularly in making comparisons between your own operating performance and that of another fleet.

"With the accounting system referred to as a firm foundation of truck cost, there are numerous control records prepared by us, forming the basis of successful fleet management.

"*The Annual Operating Statement:* Shows, for the various main marketing divisons by makes and sizes of trucks, the split of the various expenses going into the operating cost of the machines, according to the headings previously referred to. This record also gives the average performance as well as unit costs, and should be continually on the desk of the fleet manager. It acts as a basis of the many studies involving trucks.

"Branching off from the basic records of this statement, there are prepared from time to time special statements involving special fleet operating data, such as bulk hauling fleets, as applied in competition with rail transportation; asphalt distributor fleets, which find seasonal activity; special competitive studies of trucks of similar size but different make, and many other fundamental studies.

"*Motor Tank Performance Report:* Made up monthly and forwarded to each division manager showing his standing, as well as the standing of others in his marketing district. The report shows the average of the work performed by each general sized vehicle in his field for the previous month, together with the percentage of loaded capacity carried and the gallons delivered per month. In addition, a last column indicates the cost per gallon delivered, and is obtained by charging each division for each and every machine in the district at a unit rate, based on the prior average of district performance.

"This total cost, divided by the total gallons delivered, gives us the cost per gallon; and has tended to create quite a spirit of rivalry among the various field managers in an endeavor to place their districts as near the top of the list as possible. This statement reaches the managers about the 10th of the month following, and is issued on this basis rather than waiting for the actual costs, thus eliminating considerable delay.

FOR information on classification of records and the type of forms to be used in motor vehicle accounting, J. G. Moxey refers to previous work on these subjects by the sub-committee report of the maintenance and operation group of the Society of Automotive Engineers, presented before that body at Newark, N. J., Oct. 1928 by L. V. Newton, and to a paper by G. R. Gwynne before the 1928 Institute meeting on "Motor Vehicle Cost Accounting." The major portion of Mr. Moxey's paper is devoted to the application of records.

"*Equipment Location Records:* Consisting of cards indexed first as to the location of the trucks, showing the identity of the machines at a particular point; and, second, by truck number, showing the location of each individual truck. Right here, let me inject a thought which may prove of considerable assistance in the running of a fleet, involving as most of them do, several different makes and sizes of vehicles.

"The number of the truck itself discloses its actual identity and age by a very simple process. Each truck number is divided into two groups, separated by a hyphen. Starting from the right, the first two figures indicate the make of the machine, e.g., 01 for one make of machine and 02 for another; 03 for still another, and so on. The third number represents the tonnage of the machine as rated by the operating department. The number on the left of the hyphen is the particular equipment number in company service of that particular size and make of truck; and, by use of a reference memorandum showing the year that a certain numbered series of trucks of a certain size and make entered service, the age of any specific truck is readily obtained.

"*Tire Record Report:* Furnished semi-annually and compiled from the data of tires removed during the period covered. It shows the average cost per mile of the various sizes and makes of the different manufacturers, and acts as a ready guide in the purchase of additional equipment. In passing, it would be of interest to note that on a study recently completed, involving about 10,000 tires removed over a period of six years, it was definitely shown that the secret of long mileage was the application of the proper type of tire to the service to be rendered.

"As an illustration confining ourselves to those machines equipped with either solid or air core type of tires most fleets are made up of three general classes of transportation:

"1. Short distance, semi-improved delivered service requiring undoubtedly a tire which I would care to class as the 'mud-digging' type. Such machinery is necessarily of the light duty type in the 1½ or 2 ton class.

"2. This same class of service in the intermediate or light-heavy duty type, delivering over fairly long routes. Trucks in this class of service require the same general type of tire as the previous group; but where these same machines are confined to the delivery of products in the larger metropolitan centers, the tractive type of tire seems best suited.

*The Atlantic Refining Co., Philadelphia.

"3. Last, the large heavy duty truck, either on bulk delivery to the trade or on truck and trailer service in railroad competition, again requiring the tractive type of tire. * * *

"*Specification Sheets:* Giving, in not too elaborate detail, the special points of the machines themselves. They are kept at the parts depots having jurisdiction over that particular machine; so that, for example, if new piston rings are ordered for a truck in the field, a quick reference to the specification sheet indicates the exact size of the ring to be shipped, including any oversizing, if by chance the block had been rebored. This record is of particular interest to the stock clerk.

"So much for the operating end, and now for the application of a few records to the maintenance problem:

"*Service and Repair Shops:* Being established in a location as central as possible to the center of machine distribution, they are operated on the theory that constant production schedules, avoiding seasonal peaks, tend to create a maximum efficiency by not causing any variation in personnel.

"*Shop Overhauling Schedules:* Are based on the opinion of the local inspector backed by a similar opinion from the chief inspector for the district. These schedules are then submitted to centralized control, and the accounting department indicates the total gallon miles performed between overhauls. The trucks must have performed an average amount of work since the last overhaul before they will be permitted to enter the shop without a special dispensation; in that case to be definitely explained by the inspector in charge. This has tended to stabilize this portion of the business. The overhaul schedules, once arrived at, are issued for the personal information of the inspectors and shop foremen, and under no circumstances are allowed to find their way into the hands of the operating field personnel for fear that a manager or chauffeur, knowing that a particular machine is about to be overhauled, will deliberately allow it to run down from a mechanical standpoint.

"The shop getting the machine must first make an estimate as to the cost of reconditioning, and is allowed to proceed without any further authority, provided its estimates for doing the work are within a stated allowable tolerance. If in the opinion of the foreman, however, an over-run in the cost will result, the shop is not allowed to proceed further until investigation has been made and the authority of the home office has been obtained to proceed with the work.

"*Lubricating Specifications:* Covering the use of only specific materials in trucks, and issued for the main seasons of the year, summer and winter. Any location where these recommendations are violated is brought monthly to the attention of the maintenance department, and steps are immediately taken to see that the condition is corrected at once.

Gasoline Tax Should Protect Against Bootleggers, Insolvent Accounts

By Hubert B. Fuller*

(Presented before American Petroleum Institute, Chicago, Dec. 3 to 5)

THE most amazing phenomenon in the whole history of taxation has been the growth of the gasoline tax.

Early in 1919, the people of Oregon initiated a tax of 1 cent per gallon on gasoline. During the same year North Dakota, New Mexico, and Colorado also enacted gasoline tax laws, levying in each instance a tax of 1 cent per gallon.

The tax was so prolific in the revenue which it produced, and apparently so free from public criticism, that it was immediately hailed by public authorities and those interested in expending its proceeds as a delightful method of raising money for performing functions which theretofore had been paid for either by the owners of real estate in the form of assessments upon their property or by the public in general through the medium of bond issues.

In 1921, the first 2 cent gasoline tax appeared. The passion of legislatures for this tax increased with each successive session, and in 1923 eight states were levying a 3 cent tax. The movement spread like an epidemic, and in 1927 46 states and the District of Columbia had enacted gasoline tax laws levying taxes ranging from 2 to 5 cents per gallon.

New York and Massachusetts alone had then failed to pass gasoline tax laws. These states subsequently succumbed to the epidemic; and today every state of the union, including the District of Columbia, has a tax on motor vehicle fuel.

According to the latest compilation, seven states and the District of Columbia levy a tax of 2 cents per gallon; ten states have a tax of 3 cents per gallon; one state has a tax of 3½ cents per gallon; nineteen states have a tax of 4 cents per gallon; eight states a tax of 5 cents per gallon, and three states have a tax of 6 cents per gallon.

In Oregon, one of the ten states now having a 3 cent tax, the tax will be increased to 4 cents per gallon on Jan. 1, 1930, and we shall then have twenty states levying a tax of 4 cents a gallon.

The history of gasoline tax legislation in Ohio is typical. I mention Ohio because it is that state with which I am most familiar. In 1923, a bill was introduced in the general assembly of Ohio imposing a tax of 2 cents a gallon. By the concerted efforts of the various automobile associations and the oil companies, this bill was defeated.

The proponents of the measure strengthened their battle lines, invaded the primaries, and nominated and elected candidates to the general assembly who were pledged to the support of a 2 cent gasoline tax. They traded votes on all manner of unrelated subjects, and in the spring of 1925 Ohio was saddled with a 2 cent tax.

The oil companies appeared before the general assembly and raised their voice of protest. Advocates of the measure declared they hoped the 2 cent tax would raise $8,000,000 a year to be devoted to the maintenance and improvement of public highways.

*Representative Ohio Petroleum Marketers Association.

—Underwood & Underwood

M. W. Mattison, of the institute staff. He has directed the work of the general committee on uniform methods of oil accounting

Based upon the statistics then available, we asserted that the tax would cost the automobile owners $12,000,000. This estimate was ridiculed. We further told the members of the general assembly that in two years the advocates of this bill would again appear before the assembly demanding an increase in the tax. The tax advocates denied this, and the author of the bill asserted that if the measure raised $8,000,000 a year it would meet their happiest expectations.

As a matter of fact, in its first year the law raised not $8,000,000 which they hoped, not $12,000,000 which we predicted, but over $13,000,000. And yet, in spite of that enormous revenue, greater than that paid by any state in the union except California, the Ohio general assembly in 1927 increased the tax to 3 cents a gallon and dedicated itself to an even more comprehensive system of highway building.

The bill increasing the tax to 3 cents a gallon would have been defeated upon its merits in the Ohio senate, where the proportion of rural members is less than in the house, but it so happened that the members from the cities were interested in securing the enactment of a bill increasing the salaries of judges. Now there is no possible connection between the salaries of judges and a tax on the sale of gasoline; but by one of those odd coincidences frequently observed in legislative bodies, when the general assembly had adjourned, both the gasoline tax increase—which the rural members wanted—and the salary increase for judges—which the city members wanted—had been adopted.

In 1927, this tax cost the automobile owners of Ohio $20,475,687, and in 1928 it cost $25,000,000, levying upon the automobile owners of Ohio the largest amount paid in any state in the union—exceeding even California with its summer climate and year-around tourists.

In 1929, the Good Roads Federation, the material men, and the rural elements of the state again joined hands, and with the plea that "the farmers of the state must be pulled out of the mud" again invaded the legislature of Ohio and demanded a further increase in the tax on gasoline, this time in order to pave the township roads. Now as a matter of fact, the township roads for the most part merely lead from the main highways or county roads into the back districts and, I hope no one will be offended if I refer to them as sublimated lanes.

The cry of the gasoline tax advocate has constantly been: "Let those pay for the roads who use them." But the city automobile driver who pays the great volume of the tax, because there is more of him and because he drives his car a greater mileage, does not use these township roads, is not benefited by their improvement, and certainly has no more than an abstract interest in extricating from the mud the farmer whose judgment or luck has placed him there. In this demand for the improvement of the lesser township roads, the gasoline tax advocates demonstrate that they will not be satisfied until every type of a road has been paved, maintained, improved, and repaved. The cost of such a program paralyzes the imagination, but the threat is a constant menace because of the powerful driving forces mustered in support of it.

In Ohio when the gasoline tax bills and the amendments increasing the tax have been under consideration, there have been actively lobbying not only the farmers—who are interested in having the city man pay for their highways—but also the representatives of the Good Roads Federation—many of whom demonstrate the zeal of crusaders and speak of their mission with bated breath—and also the representatives of the material men.

It has even been suggested that these various interests—the farmer, the good roads advocate, the material man—when they have at last secured the improvement of all the highways and by-ways of the state, will still insist upon further gasoline tax measures in order more completely to light the highways at night and landscape

them with trees and shrubs and other decorative objects.

Eleven years embraces the amazing history of this system of taxation. Starting modestly at 1 cent a gallon in 1919 in 4 states, in 10 years it has spread to 48 states and the District of Columbia; and in not a single state has the original amount of 1 cent per gallon been retained. The productiveness of this tax presents an interesting chart. In 1921, the first year for which I have figures available, the tax produced $4,700,000. In 1923, the revenue from gasoline taxes was $36,800,000, or more than seven times that of two years before. In 1924, gasoline tax revenue was more than double the amount of 1923. In 1926, at the North American Gasoline Tax Conference, attention was called to the enormous sum realized in 1925 in gasoline tax revenue. And yet in 1928, only three years later, the automobile owners of the United States were paying in gasoline taxes an amount more than double that paid in 1925.

Statistics gathered from the various states show that in 1928 the enormous sum of $305,000,000 was produced from this tax upon gasoline consumption.

Through the increase in the use of automobiles, the increase in the number of automobiles being driven, the increase in the number of states imposing the tax, and the increase in the unit amount of the tax in the various states, it is conservatively estimated that in the current year of 1929 the automobile drivers of the United States will pay in gasoline taxes the enormous sum of $450,000,000, or approximately 50 per cent more than paid last year.

Does the automobile driver realize that the sum of $450,000,000, which it is estimated will be produced this year, constitutes 45 per cent, or nearly one-half of the annual appropriation bills of the United States government for all its activities during the years immediately preceding the outbreak of the World war?

It is difficult to realize that automobile drivers are today paying, as a tax merely upon the gasoline which they use in their daily driving, an amount equal to nearly one-half of the entire revenues of the general government of the United States during the last of the peace years, when the federal expenditures were upon a normal basis. This is in addition to the annual license fees and the personal property taxes on their cars, which they are required to pay in most states.

The tax ranges all the way from 10 to 30 per cent of the retail selling price of gasoline. On almost any other product, this tax would be denounced as confiscatory. The excise taxes imposed by the United States government during the period of the World war to raise the revenues required to maintain enormous armies in the field, in most instances, did not exceed 5 per cent of the wholesale prices of the commodity taxes. Such a tax upon shoes, clothes, or any other similar commodity would be bitterly denounced. By what psychology has the tax on gasoline escaped this criticism?

The tax on gasoline is not a rich man's tax, in spite of the early attempts of its advocates to so popularize it. Automobile owners on the average are not wealthy. This is demonstrated by the enormous number of low-priced cars, by the number of second-hand cars bought, by the amazing amount of mortgages with which automobiles are encumbered, and by the small per capita sales of gasoline to pleasure cars at retail stations.

An analysis of retail service station sales to Ohio automobile drivers reveals the enormous number of sales of two and three gallons each, where the owners of the cars have manifestly been without the ready cash necessary to purchase larger quantities.

Any week-end you will observe that the automobile drivers on the highways are people of moderate means out for a holiday—the rich man is playing golf at his club. The advocates of this tax have repeatedly boasted of the economy of its administration. They lose sight of the fact that the tax is not collected by administrative officials who are charged with the collection of most taxes, but is collected by the oil companies at their expense—and without expense to the state. It is the only tax which is not only collected without cost to the state, but is also guaranteed.

For example in Ohio, where we have a 4 cent gasoline tax, if the oil company upon which the tax is levied sells a carload of 10,000 gallons of gasoline and the purchaser becomes insolvent and the account is lost, then the oil company not only loses the amount of its invoice but, in addition thereto, must pay to the state a tax of $400 upon gasoline for which it has never received a penny. In other words, the tax is not collected without cost. The fact is merely that the state, by legislation, has freed itself of the cost of collecting the tax, and has imposed that burden upon the oil companies.

While the state probably should not be required to guarantee the accounts of oil companies or be responsible for credit losses; yet, upon the other hand, it is distinctly unfair to require oil companies to pay the very considerable amount of $400 in taxes to the state upon a carload of gasoline for which it has received no money. As the tax increases, this burden of course increases.

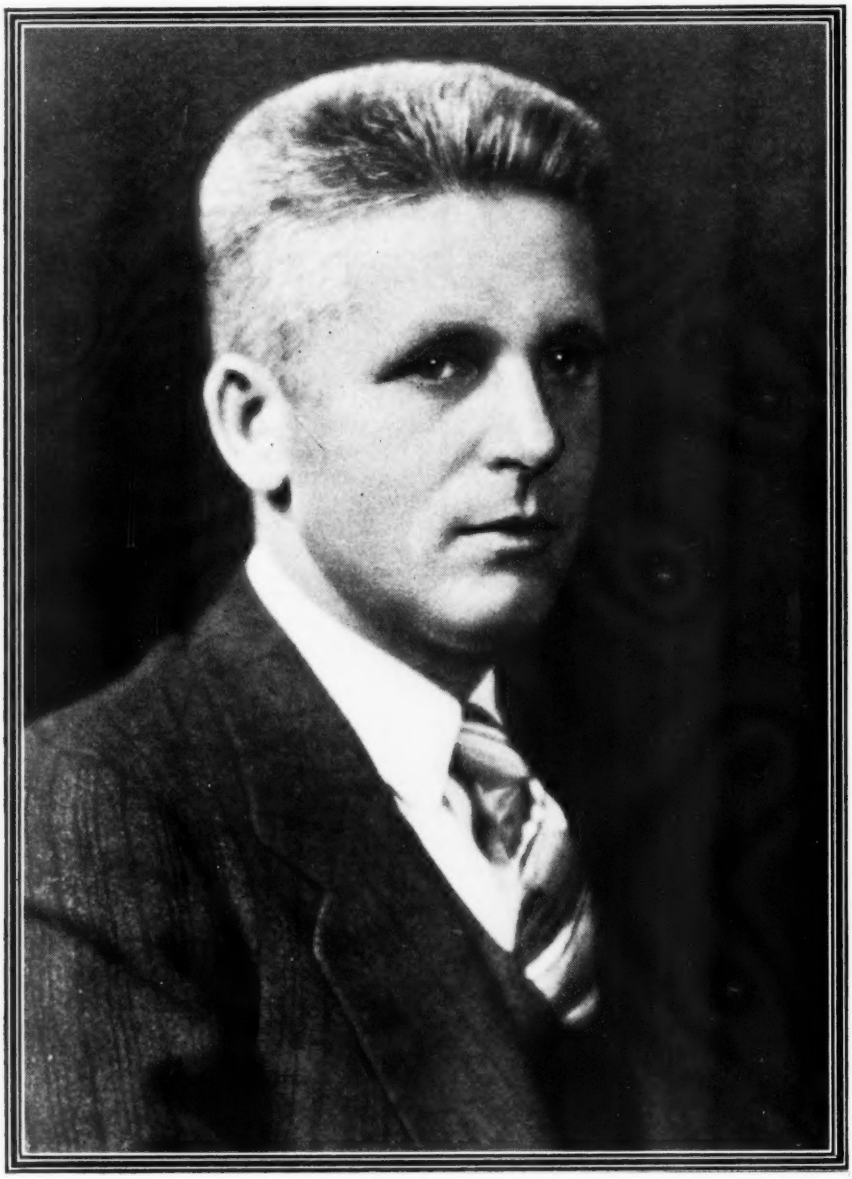
In discussing the future of gasoline tax legislation, we must notice the tendency of the various states to rewrite their laws upon a receipts rather than a sales basis, largely to secure greater facility of administration. This makes it imperative that in all such states the oil companies should protect themselves by securing a statutory provision allowing a deduction for those unavoidable losses by leakage, evaporation, temperature variation, etc., which are a necessary part of handling petroleum products. This should be sufficient also to reimburse the oil companies for the actual cost of compiling reports and making returns, and those other items of tax collection which the states have so blithely heaped upon the oil industry.

The provisions of the various state laws by which farmers and other users of petroleum products for non-highway purposes secure a refund of the tax on quantities used in tractors, motor engines, manufacturing, etc.,

INCREASING diversion of the gasoline tax funds to other purposes than road improvement and use of the funds, at the behest of rural communities, for building township roads of little use to city motorists, who pay the great volume of the tax, are two factors which may bring the public to turn against the state gasoline tax.

This was brought out by Hubert B. Fuller, Cleveland attorney, and representative of the Ohio Petroleum Marketers Association, in an address on the "Motor Fuel Tax and its Future" presented at the group meeting on taxation of the American Petroleum Institute at Chicago.

While the tax laws are being rewritten by the various states on a receipts rather than a sales basis, the oil industry should endeavor to secure protection for the marketing company against being forced to pay the tax on insolvent accounts where the oil company also loses the amount of its invoice; also protection against the bootlegging firms which either pay no tax, or render fraudulent returns and pay taxes upon only a small part of the gasoline they sell.



Underwood & Underwood

L. M. Fanning, director of the public relations program of the institute. His headquarters are at New York

should be repealed. They have furnished the opportunity for petty frauds, especially in the rural districts. If the farmer is the principal beneficiary of this tax, as he admittedly is, he should not be open to the charge of using tax refunded gasoline for all of his activities.

One of the serious problems arising from the gasoline tax laws has been the bootlegging of gasoline—the purchase of gasoline in interstate commerce by individuals or firms who either never pay any tax at all, or render fraudulent returns and pay taxes upon only a small amount of the business done by them.

Such groups have become very active in many of the large cities. They have no discoverable assets. They organize small paper corporations doing business today under the name of one corporation, tomorrow under the name of another, and the third day under fictitious names; with the result that, when their activities are discovered by the state inspectors, there are no assets against which the state may levy to enforce collection of the tax. They have no plant; they have no equipment; and, in some instances, they even have no offices. For the types of business which they do, it is not essential that they should have any of these attributes of a legitimate concern. Rather it is desirable not to have them.

The gasoline tax laws must be amended to reach this lawless element. While honest oil companies may have no occasion to be concerned over the failure of the state to collect some part of the tax; yet they have a right to demand that they shall be protected from the demoralizing competition of dealers who, solely because of the gasoline tax laws, are able to undersell the market at from 2 to 4 cents a gallon and still make the same profit.

This is a protection which the state owes to honest business and a protection which the oil companies have the right to demand shall be furnished them. Admittedly, it may be difficult to provide this protection; but it must be done. The difficulty with most remedies suggested is that they impose a serious burden upon honest companies without curing the trouble. Unless the gasoline tax law imposes the tax directly upon the motorist and makes the oil company the agent for collection, failure to pay the tax cannot be treatd as embezzlement.

To make the gasoline tax a continuing lien upon the assets of all oil companies does not meet the situation, because these individuals are careful to have no discoverable assets. The lieu theory imposes an intolerable burden upon responsible dealers, especially those with widely distributed real estate and leasehold interests, and does not guard against the dishonest dealer who has no assets. Mere fines have not cured the evil because, like that other form of bootlegging, the profits seem greater than the penalties even when conviction is assured.

The only solution seems to be imprisonment, and future amendments to gasoline tax laws must impose such penalties. This evil was relatively trival when the tax was only 1 or 2 cents a gallon, but the increase in the amount of the tax has placed a premium upon this form of dishonesty. It is one of the intolerable features of gasoline tax legislation.

Responsible oil companies have the right to insist that the authorities shall protect them against loss of business from competition of that character, without imposing handicaps upon their business which fail to correct the evil. In Ohio, the last session of the general assembly sought to reach the irresponsible dealer by an amendment requiring all buyers of tax-free gasoline in tank car quantities to post a bond of $5,000, with satisfactory sureties to insure the payment of their taxes. This has not met the situation, since the unscrupulous bootlegger now buys the gasoline without registering; or he can afford to put up such a bond and sacrifice it out of the profits of a single month of illegitimate business. Many of the states require bonds

where a dealer has once become delinquent. Manifestly, more severe penalties must be invoked.

The future of gasoline tax legislation is uncertain. Its advocates and its beneficiaries are constantly pleading for the improvement of more roads, the collection of more taxes, and a constant increase in the rate. The increase to 6 cents a gallon in one state furnishes a precedent which they can urge upon the next state. But somewhere soon they must face the economic law of diminishing return. At some figure, this tax will impose so much of a burden that it will reduce the sale of gasoline and the use of motor vehicles.

Undoubtedly, we would already have reached that point except for the situation in the oil industry. The discovery of flush pools of production, the results of the research of petroleum chemists, the improvement of cracking and refining processes have all combined to reduce the cost of gasoline. If the price of gasoline had increased as have the prices of almost all other commodities, we would already have seen a bitter and effective protest against this constantly increasing burden upon that great proportion of our population made up of owners of motor vehicles.

Unfortunately, the gasoline tax advocates have been able to show that the price of gasoline to the consumer, including the amount of the tax, is in most states less today than it was before any tax was imposed. Had the price of gasoline increased in the same manner as other commodities, the automobile driver would have become keenly conscious of the burden imposed by this tax. Had the price of gasoline mounted to $1 a gallon, as was predicted a few years ago by the elder Senator La Follette, there would be very little gasoline tax legislation today. If and when gasoline does increase in price, say to 25 or 30 cents a gallon, then the public will revolt against this continuously mounting tax.

The enormous amount of revenue raised by these gasoline tax laws undoubtedly promotes extravagance, and will some day produce scandal. Men cannot over long periods of time have large sums of money at their disposal without becoming careless and extravagant in its expenditure, and without the danger that here and there scandal will develop. As yet, the administration of the gasoline tax law has been peculiarly free from the unhappy suspicion of scandal. But only an undue optimist can expect that it will always continue so.

Whenever larger states of the union can rid themselves from the legislative domination of the rural districts, we shall also find a reduction in gasoline tax legislation.

In almost every state in the union, the legislature is dominated in at least one of its houses by members from the rural districts. This is the result of the unit method of representation. This is true in New York; it is true in Ohio; it is true in Illinois, and it is true in practically all of the other states having a few large metropolitan centers and also a large rural area.

So long as the vote of a rural member representing a population of 15,000, has the same weight in the legislature as that of a member from a metropolitan city, where his vote represents a population of 100,000, and so long as that rural member is determined that the cities shall bear the burden of all highway improvements, this situation will continue. But when the time comes, as it must, when the city voter shall have the same representation in the legislature as the rural voter, the brakes will be applied.

One of the most vicious tendencies in this gasoline tax legislation, in my opinion, will also tend ultimately to defeat it. It has been so lucrative, and there has been so little real protest over its collection, that many states have already begun to divert its proceeds to other purposes. The principle of the tax may be correct, and the enforcement of a reasonable tax with proceeds devoted solely to rational highway construction may be justified; but the public is bound to rebel against the steadily increasing rate and against the disposition to divert the revenues to purposes other than good roads.

For example, in Alabama and Arizona, one-half of the revenue derived from the gasoline tax is deposited in the general revenue fund. In Delaware and North Dakota, the entire proceeds of the tax are credited to the general fund of the state. In South Carolina, one-third of the fund is used in defraying the ordinary expenses of the government. In Texas, one-half of the gasoline tax revenue is appropriated to the public school fund. Florida devotes a million dollars a year of its gasoline tax revenue to the support of public schools. In New Mexico, a portion of the gasoline tax revenue is diverted to the maintenance of a state fish hatchery.

All of these diversions of the gasoline tax fund violate the fundamental principle upon which the automobile owner was first persuaded to acquiesce in the tax. With the exhaustion of other sources of revenue, and with the growing mania of the states to increase their activities, we may expect increasing attempts to divert the funds produced from taxing motor vehicles to general revenue purposes and to other purposes not even remotely associated with highway building. Then it seems certain that not only will the motorist rise up in rebellon against the tax, but also he will have the active support of many of the business interests which have been the most active vocally and otherwise in fastening the tax upon him.

Manifestly, the tax cannot indefinitely continue to increase. The motorist alone can defeat it—he has the numbers; and, if properly marshalled, he has the organization. When once he becomes aroused, the legislatures will flee from his wrath. But as long as he submits without protest, his burden will increase.

Indirect Tax May Equal Direct Levies

CHICAGO—Indirect taxation, aside from the gasoline sales tax, of the oil industry in the middle west will be as great as the direct tax on property in a few years Frank E. Packard, tax attorney of the Standard Oil Co. of Indiana, told the American Petroleum Institute in a paper on "The Increasing Cost of Government."

Last year his company paid to municipalities in Missouri $89,000 in indirect taxes, and $101,000 on the property of its sales organization in that state, he will say.

In Mr. Packard's paper was a survey of increased costs of operating the federal, state, and municipal governments in the past 25 years. On the gasoline tax he said that, in 1921, the tax comprised 26 per cent of the total expenditure of states for highway purposes compared to 64.8 per cent in 1927. The gasoline tax was responsible for 66 per cent of the increased revenues of the states from 1922 to 1927.

To combat the mounting cost of government he advised business men to take more interest in affairs of state, to obtain cooperation of friends of good local government and to work to restrict its affairs to the proper channels. It follows, he said that state and federal government business will also in time be conducted along these lines.

Metallurgy Plays Important Part In Building Rotary Equipment

By H. W. Fletcher*

(Presented before American Petroleum Institute, Chicago, Dec. 3-5)

EARLY oil wells were shallow, and the loads on equipment were correspondingly light. Fishing was less difficult and wells were much less costly, so that skidding over was often the obvious solution to a too complicated fishing job. Such service conditions called for an outfit low in first cost, light for maximum portability, and sufficiently simple that it could be readily set up and repaired.

A description of the materials of one of these early rigs would include cold drawn shafting, malleable chain, cast iron sprockets and sheaves, cast iron rotaries, and low carbon lap weld drill pipe and couplings, used without tool joints. Drilling valves when used were cast iron or semi-steel.

As drilling extended to deeper territory, it became evident that the pipe coupling would not support the increased punishment; and the introduction and development of the rotary tool joint followed.

While these early tool joints were a great improvement over the pipe coupling for drilling, they were made of relatively soft material; and it soon became evident that they must be further protected against galling. A number of manufacturers began heat treating the pins only, using a simple quench and draw, or in some cases cyaniding the pin threads.

Again improvement was noticeable, and again service requirements increased in severity to a point where this solution of the problem proved inadequate. Not only was there still a remnant of the galling difficulty so common before tool joints were used, but other difficulties arose: tool joints split longitudinally and pulled off the pipe, or the pins "jumped" and parted the string. Moreover, tool joints were relatively expensive, and wear on outside diameter became a serious problem. The introduction of alloy steel and full heat treatment of both box and pin provided a fairly satisfactory solution.

While this development was under way, other parts of the rig were passing through a similar cycle; and we find on the modern rig of today seamless drill pipe—in many cases heat treated—alloy steel rotary chain, sprockets, and sheaves, steel drilling valves and casing heads, and all steel rotaries.

On every hand, manufacturers are proclaiming the excellence of their product because "it is alloy steel" and because "it is heat treated." That real benefits must be realized is apparent from the ever increasing use of these more expensive materials and processes, but what these benefits may be and how they are best secured in a specific case are not so evident.

Four quantities are customarily used in describing the physical properties of a metal. They are ultimate strength, elastic strength, ductility, and reduction of area. Each of these quantities is evaluated by testing to destruction a test piece of the material in question, of specified diameter and under specified conditions of loading.

A change in the dimensions of the test piece or in the conditions of loading will alter the numerical values secured from the test, but at least the figures are comparable between various standard test specimens. The use of these quantities as a measure of the relative suitability of various materials for a given practical application is justified, provided due consideration be given to the modifying influence of product, shape and manner of loading in actual service.

The ultimate and elastic strengths are a measure of the ability of the metal to carry load, while the elongation and reduction of area indicate the extent to which it can deform under load without fracture. This latter property is quite as important as the former, since design considerations will but rarely permit the complete avoidance of undesirable stress concentration arising from the notch effect of threads, shoulders, and keyways.

If the metal is plastic, it will yield at those points where stress is excessive, and so redistribute the load over a larger area of metal. If it is not plastic, a small crack may develop, which in turn will vastly increase the local stress; the crack will extend; the process will repeat, and complete failure will result.

Fortunately heat treatment furnishes a means for adjusting the relative values of strength and plasticity, and the introduction of certain alloys affords still further control of these properties.

*Hughes Tool Co., Houston, Tex.

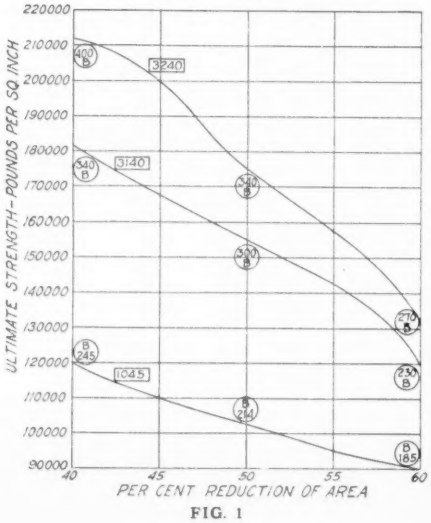


FIG. 1

WITH the exception of the carburizing and nitriding processes, heat treatment properly carried out does not alter the chemical composition of steel. It does, however, affect the physical distribution of the elements in the steel. By simply heating to the proper temperature and cooling rapidly, the strength of the material can be raised to a surprising degree, the effect being much more pronounced with the so-called alloy steels than is the case with plain carbon steels.

Unfortunately the plastic properties are simultaneously reduced; and if care is not used, stress concentration may entirely offset the gain in strength. Furthermore, the outside of the steel must be cooled first, and the

outer layers consequently shrink before the inner portions cool, setting up bursting stresses due simply to volume changes.

However, if the process is skillfully handled, actual cracking of the metal during this sudden cooling can be avoided, and the metal can then be reheated to a lower temperature, thus relieving these stresses. Therefore, heat treatment can be used to adjust the relation of strength to plasticity in accordance with estimated requirements of the job.

The tool joint can be considered as an example for the application of these ideas to rotary equipment. The most common causes of failure in early tool joints were galling, stripping of threads, wear from abrasion, tension failure of the pin, and splitting of the pipe ends. It can be concluded that if a harder and tougher material is used, galling and abrasion will be reduced; while failures in the pins and pipe ends can be controlled by using a stronger material.

Immediately, however, it will be perceived that the fundamental properties do not describe hardness and toughness directly, and further consideration shows that a satisfactory general definition is most difficult to form. However, it is safe to conclude from analogy that if the strength be raised, hardness and perhaps toughness will be increased somewhat, and then remains a decision as to how much plasticity can be sacrificed safely.

Here a question of judgment is involved, which can only be solved on the basis of previous experience and justified by service performance. Suppose, however, that a heat treated alloy steel, with an appreciably higher strength and a plasticity little—if any—below that of the material formerly used, can be found. It is reasonably certain that improvement will result if uniformity of practice can be satisfactorily maintained, for it should be kept in mind that careless handling of sensitive steel may easily result in more failures than would follow the use of a lower grade stock, unheat-treated.

Evidently, it is necessary to control the temperatures of heating and quenching, the rate of heating and—most important of all—to have some method of inspection that will cull out defective pieces before they leave the plant. In this case, inspection by Brinell impression is the most satisfactory test now available.

Brinell values and strength are rather closely correlated for a given steel, so an upper and lower Brinell limit can be set and manufacture can be started—preferably on a rather small scale at first. Now field performance must be watched closely, and the cause of failures must be analyzed; the upper Brinell limit can then be reduced if the material seems to be too hard (not sufficiently plastic), and the lower Brinell limit can be raised if the material seems too soft as evidenced by excessive galling and wear.

As data accumulate year after year, field failures will be markedly reduced and about equally divided as to cause (hardness or softness), indicating that the best possible range of treatment for that particular product and material has been developed.

This broadly is the general method of attack on all problems of this nature: first a tabulation of types of failure; then a consideration of the probable influence of a change in the fundamental physical properties; and, finally, controlled manufacture accommodated to field experience.

Many alloy combinations are on the market, and the problem of selecting the best for a given purpose is by no means a simple one. However, the steel manufacturer is often able, through past experience with related service problems, to recommend two or three steels that are fairly certain to give satisfaction, which narrows down the field.

As a measure of the relation between strength and plasticity, Fig. 1 shows ultimate tensile strength plotted against per cent reduction of area for various heat treatments. Three steels are illustrated: a simple carbon steel containing 0.45 per cent carbon; a chrome nickel containing 1.25 per cent nickel and 0.6 per cent chromium; and another chrome nickel containing 1.75 per cent nickel and 1 per cent chromium, both the chrome nickel steels bearing 0.4 per cent carbon.

If it be decided that a reduction of area of 50 per cent will represent

GRAIN STRUCTURE

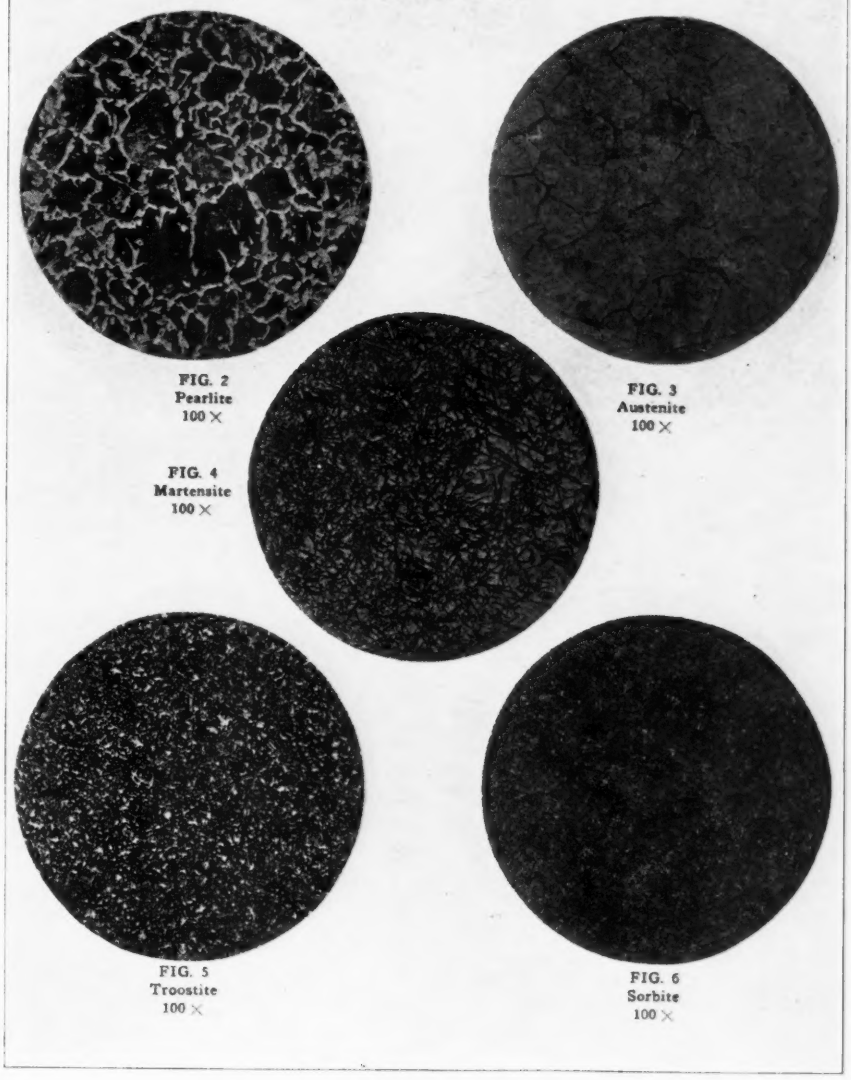


FIG. 2 Pearlite 100×

FIG. 3 Austenite 100×

FIG. 4 Martensite 100×

FIG. 5 Troostite 100×

FIG. 6 Sorbite 100×

GRAIN REFINEMENT

FIG. 7
Raw Casting
100 ×

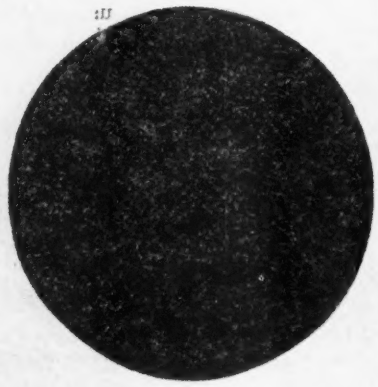


FIG. 8
Heat Treated Casting
100 ×

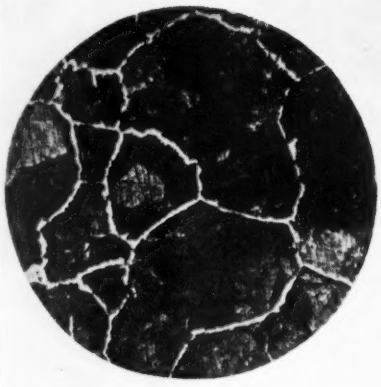


FIG. 9
Raw Forging
100 ×

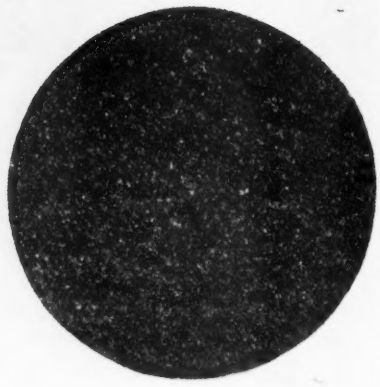


FIG. 10
Heat Treated Forging
100 ×

sufficient plasticity for the purpose at hand, and if an ultimate strength of 100,000 pounds per square inch is great enough, then inspection of the graph shows that all three of the steels meet these requirements; and the selection must then be based on relative cost, commercial availability, ease of machining, and the question of how much margin the assumed requirements provide over the actual service conditions to be met.

It must be remembered that corrosion, fatigue, abrasive wear, roughnecks with sledge hammers, and other detrimental agencies will be encountered in the field. The writer recalls one instance when a new string of chrome nickel tool joints on a foreign wildcat was cyanided in an open forge fire, while the crew waited for cement to set. Had these tools been simple carbon, they might not have been greatly harmed; but, as it was, they were ruined.

This is, of course, an extreme case, and would have little weight in determining the selection of material; but other examples may be cited that do apply. For instance, early alloy joints were made quite hard to reduce abrasive wear, while at the same time plasticity was not reduced below that of the carbon joints then in use. A most satisfactory reduction in wear resulted, but tong difficulties were so excessive that the operators undoubtedly suffered a net loss, even though their joints lasted longer.

Suppose now that experience with the straight carbon steel 1045 has been unsatisfactory, i.e., if the heat treatment produces sufficient plasticity, the strength is too low and vice versa: the question arises as to whether 3140 or 3240 shall be used. About 10 per cent greater strength can be obtained by using 3240 instead of 3140. On the other hand, the former is more expensive, more subject to internal defects in course of manufacture, more delicate to heat treat, etc.

It is entirely possible that failures might be more frequent using 3240 than would be the case with 3140. On the other hand, if service loads should increase to a point where on the average the 3140 is working very close to its limit, a 10 per cent increase in strength secured by changing to 3240 might almost eliminate failures. It is a hard question, and must inevitably be solved in relation to the special condition of any single case.

Much has been said about using heat treated alloys to increase strength, and the question might well be raised: "why not make the parts bigger?" Sometimes that can be done. A drawworks shaft, for instance, can be made 60 per cent stronger, and at the same time stiffer, if it is increased from 6 inches diameter to 7 inches diameter. It will be 36 per cent heavier, but then it is pretty heavy anyhow.

On the other hand, as can be readily seen from Fig. 1, it can be made 60 per cent stronger, but no stiffer, by substituting heat treated alloy steel; it will be no heavier, but it will cost at least twice as much. Obviously, an increase in diameter is the logical way to secure greater strength in this case, provided the greater weight does not too greatly affect the matter of portability.

On the other hand, rotary chain is subject to impact as the rollers meet and leave the sprocket teeth. If the size, and hence the weight, of the chain parts is increased to secure greater strength, the force of these impacts is increased; and it is entirely possible to reach a point where further increase of size will result in an increase in failures.

Here is an excellent opportunity to improve matters by using heat treated alloy steels. As the strength of the material is increased, the weight required to carry a given static load is reduced and, hence, the dynamic loads are less. Rotary chain manufacturers have universally availed themselves of this opportunity, securing at the same time the advantage of greatly increased resistance to wear.

A third class of product is restricted in dimension by service requirements, e.g., bits and tool joints obviously must be smaller than the holes in which they are used. There is no alternative when greater strength is required. Heat treated alloy steels will provide the additional strength in the same space, the only question being what alloy and how to heat treat it.

Heat treatment consists in slowly raising the temperature of the piece

until, at the so-called critical temperature, the grain structure—normally pearlitic at low temperatures—is converted to a form called austenite. Entirely new crystals are formed, small at first but growing larger as the temperature continues to increase.

If the steel is cooled slowly, the process will reverse, and the austenite will be converted back into pearlite, the physical properties remaining practically unaltered. If, however, the steel is cooled suddenly by plunging it into relatively cold oil or water, this transformation can be suppressed to a degree depending on the chemical composition of the specimen. In this condition, the material exhibits maximum strength and hardness, and minimum plasticity; and is generally unsuitable for service.

The microstructure resulting will depend on the speed of cooling and on the rate at which the transformation takes place, i.e., it may not be possible to cool the specimen quickly enough to prevent a certain degree of transformation; and, hence, the quenched structure, instead of being austenite, may be one of the intermediate structures: martensite, troostite, or even sorbite. Figs. 2 to 6 inclusive show representative microphotographs of these five crystal structures, in the order in which they occur in heat treatment, starting with a pearlitic structure, converted to austenite on heating above the transformation point, changing back through martensite to troostite during quenching, and altered to sorbite by reheating commonly called "drawing."

Sprockets and sheaves of 14 per cent manganese steel are martensitic in structure as cast, since these high percentages of manganese slow up the transformation to a very high degree; and even very slow cooling in sand molds is in effect a quench. Martensite is very hard, but also very brittle, and hence unsuited for this type of product; so the castings are reheated to a point where the martensite changes to austenite, and are then quenched to prevent the austenite from changing back.

The austenite is not so hard, but is much tougher and more plastic than the martensite, exhibiting great shock resistance and resistance to abrasion. Nickel and chromium added in large amounts will also suppress the transformation to a point where an austenitic structure is readily produced, and are useful because of the exceptional resistance to oxidation at high temperature and to corrosion exhibited by these alloys.

As the amount of alloy used is reduced, the rate of transformation increases; the austenitic structure can no longer be retained on quenching, resulting instead in martensite or a mixture of martensite and troostite. These structures are adjusted to meet requirements by reheating to the proper temperature, the operation being called "drawing" or "tempering."

Grain size can also be controlled to a considerable extent in heat treating. (See Figs. 7, 8, 9 and 10.) When the austenite crystals first form on heating, they are very small; and increase in size as the temperature increases above the transformation point and with time. The size of the grains in the quenched structure depends largely on the size of the austenite grains from which they were formed.

As experience has shown that, in general, the finer grained steels have the best physical properties, it is evidently necessary to keep the size of the austenite grain as small as possible, always bearing in mind the fact that heating must be carried a little above the transformation temperature to be sure the transformation is complete, and that the piece must be held at temperature long enough to reach a uniform temperature throughout. Variations in weight, shape, and alloy composition of product will control the procedure.

The foregoing discussion has dealt with the composition and heat treatment of products where uniform properties are desired throughout the specimen. There are important cases, however, where combinational properties are desired. For example, the cutting edge of a fish tail bit must be very hard to take a keen edge and resist abrasion.

Obviously, the microstructure must be principally martensite which, because of its brittleness, is entirely unsuitable for the shank and blade of the bit. The entire bit is, therefore, annealed producing a pearlitic structure; the cutting edge alone is reheated above the critical point; then quenched, retaining the required martensite structure, and perhaps drawing it back at a temperature of 400 or 500 degrees to relieve the quenching strains.

Of late the problem has been attacked from another angle: by welding to the cutting edges a very hard alloy which is practically unaffected by heat treatment. After this alloy has been applied, the bit as a whole can be normalized or annealed without affecting the cutting edge.

Still a different type of problem presents itself in the manufacture of rock bit rollers and cones. Here it is desirable that the entire surface of the parts be very hard, but the interior should preferably be soft to prevent the comparatively thin sections from cracking through. The problem is met by making the parts of a very low carbon steel, and then heating them for many hours in contact with some form of carbon. The carbon is absorbed by the steel, and a surface layer may be built up containing over 1 per cent carbon.

When this high carbon skin has become thick enough, the parts are cooled, reheated to a temperature above the critical for the low carbon core, and quenched in oil. This refines the core, but the case has been somewhat overheated and, hence, the crystals are rather large and the fracture is brittle. This condition is corrected by reheating to a temperature just over the critical of the case, but below that of the core; and the parts are again quenched. The process is completed by drawing for an hour or so at about 350 degrees to relieve quenching stresses.

The foregoing is a rather sketchy summary of the history of the introduction of heat treated alloy steel into rotary drilling equipment, and a still more superficial discussion of the manner in which the various problems encountered are attacked and the way in which heat treatment provides some degree of control over the properties of available materials.

In the past, improved equipment has been produced as required by the increasing demands of deeper drilling. Present equipment will probably prove unsuitable in the years to come, but it may be confidently anticipated that an adequate solution will be found in which the metallurgical aspect will play an increasingly important part.

Bright Stock Color

(*Continued from Page* 55)

is desired. If the acid treated steam refined stock contained approximately 0.265 per cent free acid, it could be made with 15 pounds of this pulp clay. Whereas on the other hand, if the stock contained approximately 0.370 per cent free acid, it would require 20 pounds of pulp clay to neutralize completely, with a finished color of 1⅛.

The above determinations have been conducted using only one kind of clay. However, our experience with several other grades of clay tends to bear out the above conclusions. We have, however, investigated some clays which show high efficiency in neutralizing value but practically no decolorizing properties. In plant operation, the color is approximately 30 per cent better than that obtained in the laboratory.

They are STILL swinging smoothly

—after most joints are in the junk pile

Wheaton Swing Joints are *still* swinging smoothly, *still* reducing strains and leaks, *still* saving money, long after most swing joints are buried in the junk pile.

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More and more storage stations are discovering the *difference* in swing joints. More and more are saving *leaks and replacements* by coming to Wheaton—for the smoothest-swinging and longest-lasting swing joints their money can buy.

Send for a Wheaton Swing Joint today. Test it on your pipe line. If you are not convinced that it has the softest, smoothest, easiest swinging action of any swing joint ever known, return it for credit or refund.

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FAUCETS · VALVES · JOINTS · COUPLINGS · FILLERS · NOZZLES · FITTINGS

DOES aviation require a boost? Airplane Manufacturer William Grove Skelly must be found and compelled to say a few words, with picture.

How about the International Petroleum Exposition? President of same, Skelly, does the expected boosting. And so it goes, entertaining big railroad men, bankers, Kickapoo chiefs, oil men, etc. They did spare him on the day that some moving picture company's pet lion was paraded through the streets, but that was not oversight. Mr. Skelly was out of town.

One expects him just any day now to turn suddenly and start smashing cameras right and left. We shall watch the roof faithfully for just that happening.

* * *

Sydney Roger, of the Persian field staff of the Anglo-Persian Oil Co., Ltd., has been in the Mid-Continent making a study of field operating methods.

* * *

Married: In Tulsa, Paul Lyons, assistant chief scout of the Sinclair Crude Oil Purchasing Co. and Mrs. Pauline Sheehan.

* * *

John M. Lovejoy, one time vice-president and general manager of the Amerada Petroleum Corp. and now head of the Petroleum Bond & Share Co., has been nominated for director of the American Institute of Mining & Metallurgical Engineers. Election will be held prior to the annual meeting in February.

* * *

Died: At Wichita Falls, Oscar L. Soules, 64 years old, from injuries sustained in an automobile accident. He was an Independent oil producer living in Burkburnett.

* * *

Kansas Oil Scouts Association has voted to hold a meeting, social in nature, the first Tuesday of each month. Meetings are in Wichita, most of the scouts who cover Kansas being domiciled in that city. Harry Johnson, of the Twin State Oil Co., is president of the association and Ed L. Hogan, of the Prairie Oil & Gas Co., is secretary. At the first meeting T. C. Johnson, Independent operator and proration umpire for the Sedgwick county fields, told the scouts about proration.

The Height of Something or Other: Sears, Roebuck & Co. buying space in an Oklahoma City newspaper to felicitate Montgomery, Ward & Co. on the latter's new store.

* * *

More than a score of leading Independent oil operators in Wichita Falls have joined in the organization of the Deep Oil Development Co., whose purpose is to drill or participate in the drilling of a number of deep wells in north Texas counties. Representation is given to all areas in the district. There are some 14 shallow sands producing in the district and plans are being made to drill tests which will adequately test all possible lower horizons.

The company has capitalized at $1,000,000, par value per share, $25. On Oct. 30 a meeting was held of those interested and $300,000 was subscribed.

The temporary board of directors consists of Wichita Falls men. They are Frank Kell, N. H. Martin, J. J. Perkins, James E. McKanna, W. B. Hamilton, John Hirschi, J. I. Staley, W. M. McGregor, L. H. Cullum, J. S. Bridwell, J. T. Harrell and John O'Donhoe. Two members are to be added from each of these counties: Clay, Wilbarger, Archer-Young (treated as one), and two to represent Wichita county outside of Wichita Falls.

The charter and by-laws committee consists of Leslie Humphrey, A. H. Britain, Charles I. Francis, W. E. Priddy, C. E. McCutcheon, Wichita Falls and W. H. Taylor, Archer City

The following constitute the finance committee: Wichita Falls group—J. A. Kemp, W. B. Hamilton, W. D. Cline, R. O. Harvey, N. H. Martin, Roy Riner, L. T. Burns, Ed Peterson, R. A. King, E. H. Eddleman, L. W. McCrory, Roy I. Carter, James E. McKanna, J. S. Bridwell, R. L. Underwood, E. R. Fain, Clifford Mooers, C. H. Clark, W. T. Knight, Dudley Golding, J. Alvin Gardner, John F. O'Donohoe, J. J. Perkins, J. C. Mytinger, secretary and Harry Hines, chairman.

Clay county—Dr. A. B. Edwards, Henrietta; August H. Bevering, Henrietta; Carl Worsham, Henrietta; Sam Householder, Byers; R. L. Ligon, Byers and H. W. Perkins, Petrolia.

Archer-Young counties—Tad Wilson, John Fleming, Frank M. Powers, Charles Abercrombie, Henry Prideaux, Charles Richardson, E. B. Madden, T. L. Looney and J. R. Parkey.

Wilbarger county—Harry Mason, A. M. Bourland, U. S. Davis, Luther Webb, E. H. Pigg and L. K. Johnson.

Wichita county-at-large—A. T. McDannald, J. M. Hemby, Edward Schlaffke, Gordon Douglas, J. A. Wise, W. J. Sheldon and J. A. Coker, Electra; I. E. Harwell, J. H. Brumley, Paul Browning, E. J. Williams and Rex Smith, Burkburnett; W. F. George, A. C. Golden, J. F. Boyd and C. Birk, Iowa Park.

With the completion of the financing, the company expects to start one or more deep tests within a short time.

* * *

White Eagle Oil & Refining Co. recently adopted an eight-hour working day in its refineries, including a new schedule of pay approximately equal to that the workers receive for nine hours. It was also announced that effective Jan. 1, all shift men who had had one year's service with the company would be given two weeks' vacation with pay.

* * *

H. C. Crum, who has been division geologist at Amarillo for the Skelly Oil Co., has been transferred to Tulsa general offices and will have charge of the Oklahoma division under Chief Geologist Earl Traeger. He succeeds Colin C. Rae, who now works directly with the Skelly production department.

* * *

Died: Mrs. Maude Seideman, Tulsa, wife of C. L. Seideman, traffic manager of the Imperial Refining Co. and affiliated companies. Burial was in Columbus, Kan.

* * *

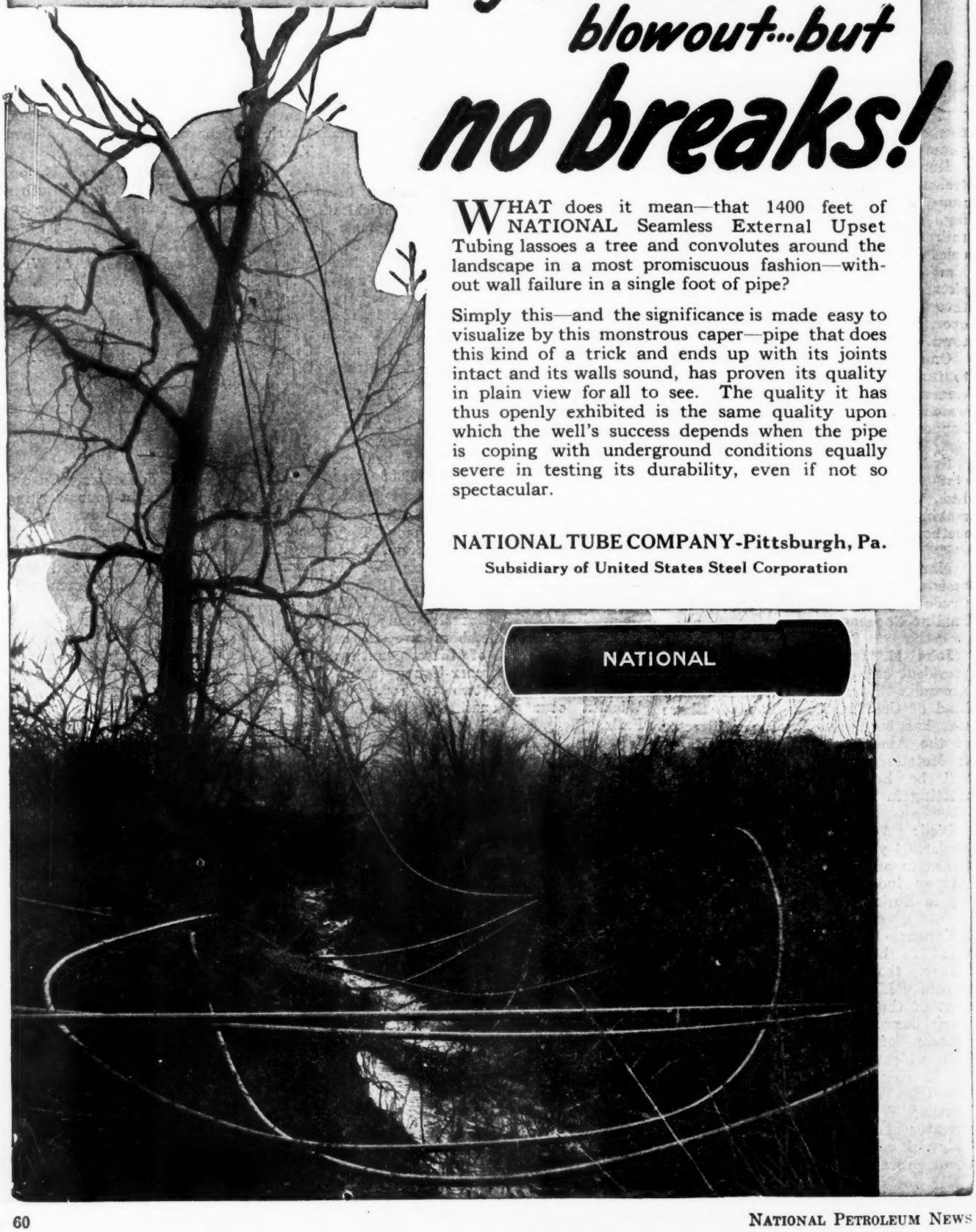
Sign on an Oklahoma office door: John A. Pearson, lawyer. Oil and gas land titles. Probate. Wills administration. Magnetometer Surveys.

Now, if he could just add a line of tool dressing and tree surgery, he would be all set for a career.

* * *

Since the Skelly Oil Co. completed the addition to its building, at least on the outside, this department will be able as never before to keep in touch with local events. In fact, it

Treed and Bent by a terrific blowout...but no breaks!



WHAT does it mean—that 1400 feet of NATIONAL Seamless External Upset Tubing lassoes a tree and convolutes around the landscape in a most promiscuous fashion—without wall failure in a single foot of pipe?

Simply this—and the significance is made easy to visualize by this monstrous caper—pipe that does this kind of a trick and ends up with its joints intact and its walls sound, has proven its quality in plain view for all to see. The quality it has thus openly exhibited is the same quality upon which the well's success depends when the pipe is coping with underground conditions equally severe in testing its durability, even if not so spectacular.

NATIONAL TUBE COMPANY-Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

will be possible to be a day or so ahead of the newspapers.

William G. Skelly, president of the company, is one of those individuals that everyone picks on to do the running of various movements. In consequence, he is forever being interrupted at his work and dragged out before a camera. The new roof on the building, being flat and affording plenty of light, is a swell place for the photographers to ply their trade.

Mr. Skelly is very good-natured about it all, having a patience born of the long and futile struggle to get a few hours to himself. He merely sighs a little when his secretary tells him another camera man is waiting outside, takes his stance and puts on an expression of extreme pleasure, which he does not always feel, by any means.

That roof is almost on a level with our window, just across the alley. Thus, we are right in on whatever big city or nation-saving event is in progress of fabrication. Is the Republican party in need of the pulmotor? National Committeeman W. G. Skelly must be yanked away from the contemplation of the company balance sheet and posed.

* * *

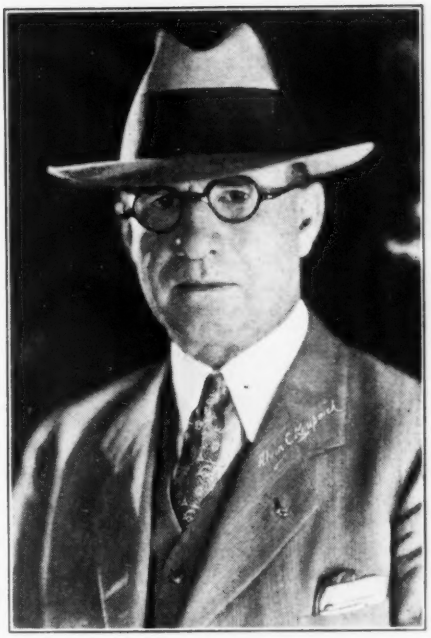
The achievement of completing five oil wells in seven days recently brought to the face of J. R. (Jim) Higgins one of those expressions of deep-seated pleasure. To a company the size of the Standard of New Jersey that wouldn't mean a great deal, but most of the Independent producing companies consider that quite a week's work.

Mr. Higgins is vice-president and general superintendent of production for the Peters Petroleum Corp. He got his training in oil in the fields of New York (he was born in that state), Pennsylvania and West Virginia. Such training in the fundamentals of oil production has been the lot of many of the outstanding executives of today.

Mr. Higgins has been in the Mid-Continent fields for 25 years. That takes him back to the days when this section of the industry was quite young. Glenpool was the big noise in these parts about the time he came.

Several years were spent with the Finance Oil Co. but his association with Charles B. Peters is an old one. The Peters corporation was formed in 1922; prior to that he had participated in the individual ventures of Mr. Peters. Besides this connection, Mr. Higgins owns a half interest and is manager of the Hill Drilling Co., operating in Osage and Creek counties.

He lives in Tulsa and has two sons who seem to be determined to follow the oil business. In fact one of them, Richard, the elder son, is now in it. He was graduated from the University of Oklahoma and became active in the conduct of the Hill Drilling Co. properties. The younger son, Kenneth,



J. R. Higgins

is studying geology in Leland Stanford.

Mr. Higgins is considered by other production men an authority on field methods. He was one of the pioneers in drilling to deeper sands in the Osage. One venture took him into foreign lands. The Middle States Oil Co. several years ago took a fancy to a structure in Cuba and persuaded Mr. Higgins to get a leave of absence and attend to the job. The well was dry but Mr. Higgins had plenty of fun drilling it.

He is quite a sportsman. Baseball, football and the exponents of the fistic art command his patronage. He is one of the faithful attendants of the hockey games in Tulsa. He has never succumbed to that insidious disease, mistakenly called a pastime, known as golf. That may be one reason why he is a good oil man.

* * *

Joke Department: It seems, according to one of our traveled friends, that a geologist who took a fling on his own behalf, at Arizona, finally became quite low in funds. He had eaten but little for a week when he arrived one day in a tiny town. He was down to his last half dollar but he decided that he must eat, even if it took all his capital. He entered the one restaurant and found that the only thing on the menu was sage hen.

"What," he asked the proprietor, "is a sage hen?"

The restaurant man explained that it was a fowl that lived in the vicinity.

"Then count me out," said the geologist. "I will have nothing to do with a creature that has wings and still stays in Arizona."

* * *

Change in the name of the Continental Oil Co.'s Canadian operating subsidiary from Hudson' Bay Marland Oil Co. to Hudson's Bay Oil & Gas Co., Ltd., has been made, announced R. Van A. Mills, vice-president and manager.

* * *

We see by the papers that Blaine Johnston, of El Dorado, Ark., has become field superintendent in Arkansas and Louisiana for the Simms Oil Co. Mr. Johnston has had much development experience in this area as one of the owners of the Arkansas Drilling Co. He is also one of the inventors of the Johnston sand tester, which has been considerably used in the wells of south Arkansas where thin sands can easily be passed by in rotary drilling.

* * *

Ten Years Ago

(From National Petroleum News, Dec. 3, 1919)

Coal shortage, due to labor trouble, causes increase in fuel oil demand.

Standard of Indiana buys 3000 cars of gasoline in Mid-Continent.

Louisiana Oil Refining Corp. increasing plant capacity from 3000 to 7000 barrels.

Oil Discovery Made On Rio Grande

HOUSTON, Nov. 30.—The Texas Co.'s discovery of an oil field, near the Rio Grande boundary, in Starr county, Texas, has carried production to the farthest south point in the United States. The third test drilled on the Guerra tract, near the old town of Roma, tested 123 barrels of light gravity crude in 45 minutes in sand found at 3584-3590 feet. The well was shut in at the end of this week for storage.

The gravity of the oil is similar to that found in the Laredo district to the north, near Randado and Mirando City, respectively in Jim Hogg and Webb counties. Depth at which the pay was found is from 1200 to 1800 feet deeper than in other parts of the Laredo district. Advices from the field, however, indicate that similar formations were penetrated in both territories. Bedding planes of the interior region of southwest Texas dip fairly rapidly toward the coast in this territory, accounting for the difference in drilling depths to reach similar formations.

Entire development of the Roma field will be in the hands of The Texas Co. The large block on which two unsuccessful tests and the present discovery were drilled was originally assembled by R. E. Brooks Jr., of Houston, for his Southern Exploration Co., after which The Texas Co. acquired a half interest. Later, when Brooks sold an additional interest in the property most of it went also to The Texas Co. There are no leases outstanding inside the block boundaries, insuring against competitive line drilling.

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TWO tests prove every Jenkins Valve made for use in the oil industry. First a factory test—an oil test at greater than recommended pressure—to prove that the valve can weather the severity of oil field and refinery service.

Second, there is a field test—the test of time, of long, uninterrupted service in the line, a characteristic of Jenkins Valves that have made them the first choice of veteran engineers.

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VALVES
Since 1864

Skelly Cores 135 Feet of Rich Sand In Oklahoma City Well

By John Power
N. P. N. STAFF WRITER

TULSA, Nov. 30

ALTHOUGH no spectacular completions were recorded in the Oklahoma City pool, the area continued as the most interesting spot in the state during the week. The Voshell pool of McPherson county, Kansas, added a new Wilcox sand well to hold the center of the stage in that state, while the Texas Panhandle found a 500 barrel producer about six miles southeast of Lefors, its most important well of the week. The week could not be regarded as exciting.

The Oklahoma City pool did have another completion, however, the Mid-Kansas Oil & Gas Co. No. 1 Mollman, in the SE of 23-11N-3W. Although it extended production a half mile in a west by southwest direction, the well's initial production of 1800 barrels was not large enough to cause any hysterics. It is a sand well, with the pay at 6382-6400.

The well's relatively small initial was looked upon by some as indicative of an edge well. It is, of course, difficult to the point of being impossible to do much limiting on the strength of one well. Had the well been allowed to produce it might have been possible to learn more about its structural position by watching the amount of production and by deeper drilling. But in accordance with the operating agreement covering the development of the pool it was shut in, and any information which the well might be able to give will have to be postponed for a while.

Had it been allowed to produce the Mid-Kansas well might have held the spotlight, but as it was it had to share attention with the drilling well being put down by Skelly Oil Co. on the southeast corner of the field as defined to date. This test, in the NW NE of 31-11N-2W, has cored 135 feet of true, saturated sand so far, with but two feet of shale break logged.

The Skelly well topped this unusually large sand body at 6251, and at 6386 are reported to be still coring rich sand. The big gas, which has been found in other Oklahoma City wells was picked up by the Skelly well at 6260-6320, and amounted to the conventional 50 million feet per day which is expected in the area.

The presence and possibilities, both geologically and productively, have centered attention on this test. Just what it does mean is uncertain. Some incline to the belief that it is Simpson in place, and that Simpson and possibly Wilcox production will be found south and southwest of the present Siliceous lime production. Others, notably Skelly Oil Co., refuse to commit themselves.

The Oklahoma City area as a whole continues active, although the proration of the wells makes intelligent study of changing production figures difficult. Water in small amounts has appeared in two more wells, but not in sufficient quantities to be anything like alarming as yet.

ANOTHER huge Siliceous lime well was added to the list of big wells at Oklahoma City. The Indian Territory Illuminating Oil Co.-Foster Petroleum Corp. No. 2 Fortson-Farley, blew in as it was being bailed. It made 815 barrels the first 30 minutes, and 1965 barrels the first hour. In the NE of 24-11-3W, it does not extend production.

New locations continue to be made, six stakes being driven in the field during the past week. They were equally divided between the Indian Territory Illuminating Oil Co.-Foster Petroleum Corp., and the Sinclair Oil & Gas Co. Several wells have reached the bailing stage, and may be completions before long.

The Voshell pool, southern McPherson county, is one of Kansas' most interesting plays. The pool's fifth producer was added during the week when the Mid-Kansas Oil & Gas Co. No. 1 Voshell was drilled into the Wilcox for an initial production of some 40 barrels per hour. This is the first well to give any indication of the east-west direction which the production might take, as the other four wells of the pool follow each other in a straight line south along the east section line of 9-21S-3W. The Mid-Kansas well is in the NE NW NE of the section, and extends production a quarter mile westward. It picked up the Wilcox at 3192, and drilled to 3197. The production is coming from the last three feet of pay drilled.

In Ellis county, in the central western portion of the state, drilling activity has been brought to a standstill by the operators agreement which called for the shutting in of the area's most recent strike.

Phillips Petroleum Co. agreed to shut in its No. 2 Shutts, in the SW NE of 5-12S-17W if the offset owners would refrain from drilling. As is often the case those who had the drilling to do agreed to hold off a while if the Phillips would shut in. The agreement was reached, and the well, which swabbed 375 barrels the last 24 hours it was produced, shut in. A time limit on the shut-down period was not set, but it is understood that it will be in effect until 1930.

Over in the Texas Panhandle, Gray company has another good producer in a spot where anything might have been expected. This well, The Texas Co., No. 3B Chapman, section 69 Block 25 H&GN Survey, had an initial of 550 barrels from a granite wash pay found from 2650 to 2675. Offsetting this well on the northwest, Skelly Oil Co., has about the same sort of a well at a total depth of 2806.

Magnolia has nothing but a gas well on the west and it was a question for some time whether anyone else would hit. Less than half a mile to the north of this group of wells a good sized fault is known to exist. It seems to run northwest southeast between the well of Wilson et al and the old Sullivan well, four locations north of the recent completions. Such spotted territory as this is responsible for most of the broken hearts of the industry.

The most interesting of the new locations reported in the Panhandle is that of Vanderwide et al No. 1 Jones in Moore Co. It is to be located in the SE SW SW of section 164 Block 3T T&NO Survey. For several years an oil pool has been suspected in that particular region and a test will put much of the discussion at rest. This well will be one of the most closely watched and one of the most interesting to follow that the Panhandle county has seen for some time.

* * *

Notes on the Week

The East Earlsboro pool, which has been showing signs of petering

out along the northern flank, definitely did so during the week when nine drilling wells in this part of the pool got water in the Wilcox sand.

* * *

A closely watched well these days is the Homaokla's No. 1, in the center of the SE NE NE of 16-5-3. It is making some 15 barrels per hour on the swab from the Viola lime, topped at 3584-87. It lies along the trend of production through the original Seminole pool, southwest through Maud, Pearson, Asher. It is expected that the well will be deepened to the Wilcox.

* * *

A Siliceous lime well completed by the Wentz interests in the SW SW NE of 17-28N-1E may revive interest in that part of Kay county. Completed as a dry hole in 1923 at a total depth of 2755, the well was deepened to 3265-69 in the lime. It made 926 barrels of oil the first 24 hours, including a slight trace of water.

Recommend Oklahoma Proration In First Quarter, 1930

TULSA, Nov. 30

PRORATION of flush pools in Oklahoma is to continue to March 31, 1930, if the recommendation of the Mid-Continent Oil & Gas Association committee and of the Operators Committee are carried out.

Dec. 12, has been set as the meeting date at which time all operators are invited to consider the recommendation. If they are approved they will be submitted to the Corporation commission as the basis for a conservation order which that body will be asked to make prior to Jan. 1, and to take effect on that date.

The committee's joint report reads in part, "—the potential production of crude oil in the United States continues far in excess of demand and overproduction would now be much more serious than it is if it were not for the present curtailment measures in effect in the various states.

"With particular reference to Oklahoma the potential production from existing pools in this state for the month of January, 1930, is estimated at 799,500 per day, for February 850,000 per day and for March 922,000 barrels per day. Estimating probable economic conditions for 1930, we are convinced that the demand for crude from this state for January, 1930, will not exceed 650,000 barrels per day; in February will not exceed 665,000 barrels per day, and in March will not exceed 675,000 barrels per day.

"For these reasons it appears imperative that proration on the flush fields and semi-flush pools in the state be continued from and after Jan. 1, 1930, to at least March 1930, if wasteful overproduction is to be prevented."

The pools which it will be necessary to prorate from and after Jan. 1, 1930, are those covered by the present proration order of the Corporation commission. They are Oklahoma City, East Earlsboro, Logan county, Allen, Sasakwa, Pearson-St. Louis-Asher area, and all pools in the Greater Seminole area.

To accomplish the degree of curtailment necessary to maintain an approximate balance between supply and demand during the first three months of 1930, the committees suggest the following schedule or proration:

Suggested Oklahoma Proration Percentages

Oklahoma City	Per Cent
January	40
February	40
March	50
East Earlsboro	
January	40
February	40
March	50
Seminole, et al	
January	20
February	20
March	20

Two leaders of geological thought are shown in this picture. At the right is John Y. Snyder, individual oil operator of Shreveport and president of the American Association of Petroleum Geologists. On the left is Russell S. McFarland, vice president of the Sunray Oil Co., Tulsa, immediate past president of the association

Oklahoma Proration, Percentages Applied

Potential daily average production—January	Barrels
Oklahoma City	140,000
East Earlsboro	80,000
Seminole, et al	349,500
Rest of state	230,000
Total	799,500

Estimated production under proration—January	
Oklahoma City	84,000
East Earlsboro	48,000
Seminole, et al	279,600
Rest of state	230,000
Total	641,600

Potential daily average production—February	
Oklahoma City	200,000
East Earlsboro	80,000
Seminole, et al	340,000
Rest of state	230,000
Total	850,000

Estimated production under proration—February	
Oklahoma City	120,000
East Earlsboro	48,000
Seminole, et al	272,000
Rest of state	230,000
Total	670,000

Potential daily average production—March	
Oklahoma City	300,000
East Earlsboro	70,000
Seminole, et al	327,000
Rest of state	225,000
Total	922,000

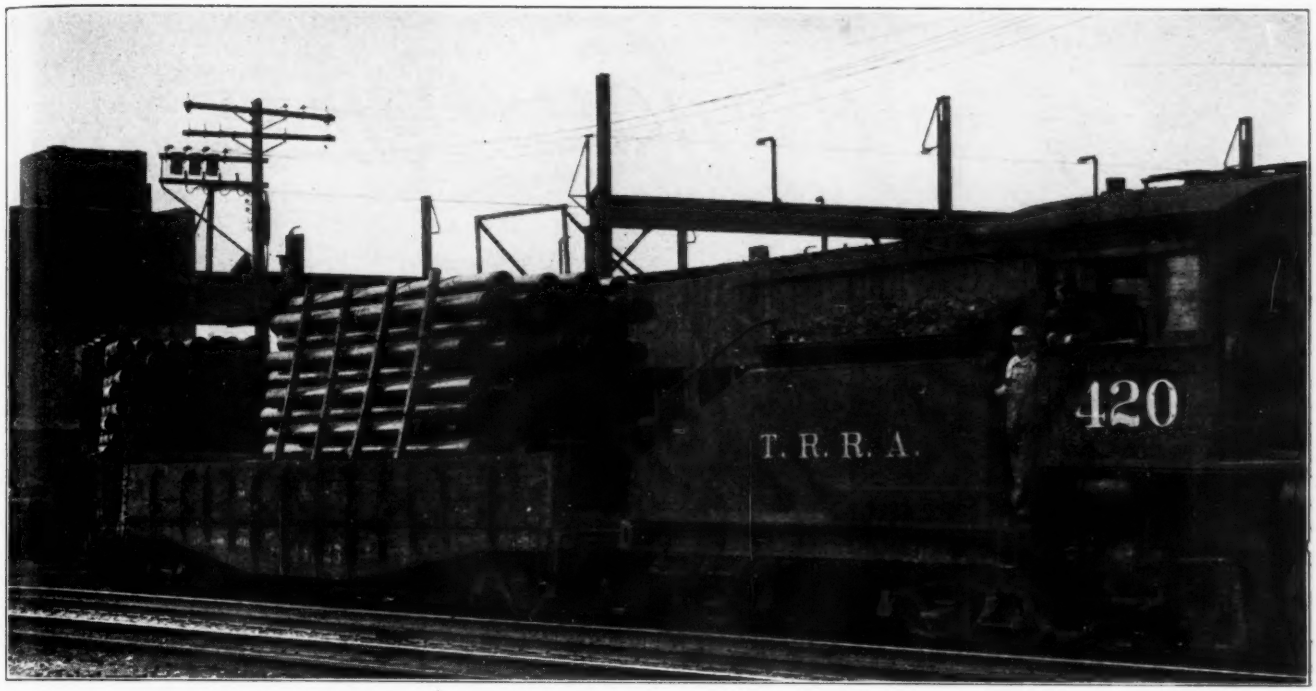
Estimated production under proration—March	
Oklahoma City	150,000
East Earlsboro	35,000
Seminole, et al	261,600
Rest of state	225,000
Total	671,600

J. B. Schermerhorn Dies In Rochester, Minn.

TULSA, Nov. 30.—J. B. Schermerhorn, president of the Schermerhorn Oil Co., died Nov. 29 at a Rochester, Minn., hospital following an operation, according to word received here by his daughter and son-in-law, Mr. and Mrs. H. A. Sherman.

Mr. Sherman is manager of the Tulsa office. Mr. Schermerhorn's home was in Minneapolis, Minn.

The Schermerhorn Oil Co. has been active for some years in Oklahoma, particularly in the Ardmore district. The company and its subsidiaries also have been active in the south Oklahoma and in Howard and Glasscock (West Texas) fields.



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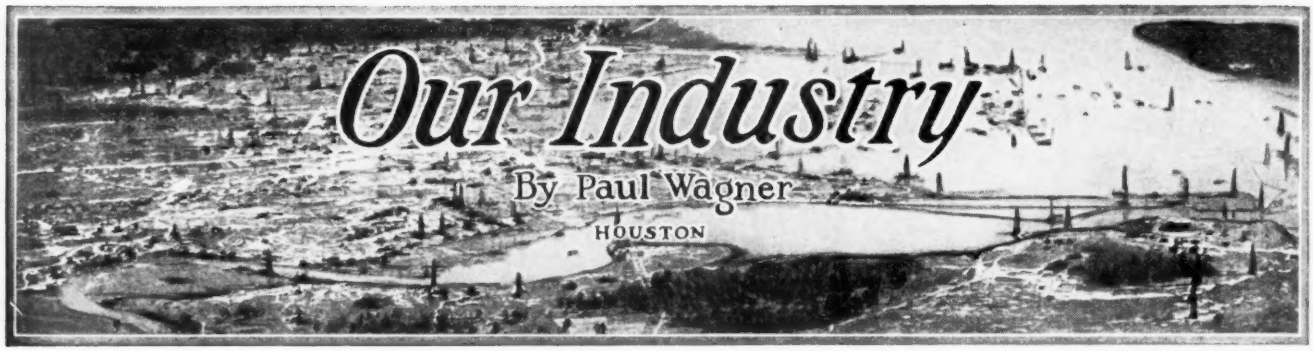


LON D. CARTWRIGHT, Jr., district geologist, is in charge of West Texas offices of the Superior Oil Co. of California, recently transferred from Midland to San Angelo. The company is not to be confused with the Superior Oil Producing Co., in charge of E. C. Edwards at San Angelo and Fort Worth, a subsidiary of the Superior Oil Corp., with Tulsa headquarters.

* * *

E. H. Stafford, land man, and Walter Burress, geologist, have been transferred from Midland to the new San Antonio offices of Louisiana Oil Refining Corp., in the Smith Tower building, E. B. Pool, land man and C. E. Hight, geologist, remain at Midland for West Texas work.

* * *

E. K. Smith has been appointed assistant general pipeline foreman of the Lone Star Gas Co., under F. E. Byrne, with headquarters at Ranger. He was succeeded as assistant pipeline foreman at Moran by L. E. DePew. C. R. Seaton, formerly of the Atlantic Oil Producing Co., is now in the purchasing department of the Lone Star at Dallas headquarters.

* * *

L. David Wosk, formerly at Abilene for the White Eagle Oil & Refining Co., has been moved to the Fort Worth offices on the tenth floor of the Fort Worth National Bank building, Fort Worth. He is in charge of geological and land work of the White Eagle in Texas.

* * *

Independent Oil & Gas Co., of Tulsa, has transferred R. E. McClung of the land department to Fort Worth as an assistant to Gilbert Wood, Texas division manager. W. R. Walker was transferred from Fort Worth to San Antonio, where he assists J. H. Turner of the south Texas district office. Land and geological work in Panhandle territory will be handled by J. Marshall Brown, transferred from Midland to Amarillo. Fred H. Wilcox, now in the Independent's organization at San Angelo, was formerly attached to the Vacuum Oil Co's. geological staff in West Texas.

* * *

Dave P. Carlton of the geological department of Humble Oil & Refining Co., heads that organization's geophysical work, of which he has executive charge at Houston. He had collaborated in that work with Raymond H. Goodrich, who recently resigned as chief of the division to engage in business for himself.

Mr. Carlton then took over additional responsibilities. He has been identified with the Humble's geological department for ten years. He is a member of the American Association of Petroleum Geologists and other organizations of professional men.

* * *

D'Arcy M. Cashin, vice president and land department manager of the Navarro Oil Co., Houston, is a geologist by training. Before appointment to his present position he was chief geologist of the Navarro and affiliated companies of the Farish-Watts-Collins group, including the Farlyn Oil Co.

Prior to that he was general manager of the Southern Exploration Co., of Texas, headed by Judge R. E. Brooks. Previously, he served the Ohio Oil Co., in Wyoming, and the Humble Oil & Refining Co., in the southwest, as geologist.

Mr. Cashin was educated at the University of California and the Mackay School of Mines in Nevada. His original industrial experience was in hard mining, first in the Empire Mines of California, later with the Nevada Consolidated and still later with the Flannary Zinc Co., in Missouri.

* * *

W. D. Stewart, assistant treasurer of The Texas Co. of California, Los Angeles, was comptroller and treasurer of the California Petroleum Corp., when that company was absorbed by The Texas Corp., a year and a half ago. Previously, he was with the American Petroleum Co., a "Calpet" subsidiary. Before that he was in the Southern Pacific organization when the Associated and Amalgamated Oil Companies were affiliated with it. His first job was that of a meter reader and collector, at $4 a week, in Terre Haute, Indiana.

* * *

Seen in the hotel lobbies at San Angelo: Robert G. Carr of the firm of Northrup & Carr, Inc., getting ready for a business trip to St. Louis and Chicago. . . . Dave Larsen, Independent operator, who helped drill in the famous Potrero del Llana well in Mexico, years ago. . . .Frank White, owner of the Naylor hotel and friend of the oil man. . . .Carl G. Cromwell, drilling contractor, who recently

Dave P. Carlton

D'Arcy M. Cashin

inaugurated an air line between San Angelo and Dallas, via Fort Worth . . . .Glenn Myers, land and royalty trader. . . .Herbert O'Bannon, banker and newly elected director of the Texas division, Mid-Continent Oil & Gas Association. . . .Ford Turner, West Texas head of the Pure Oil Co.'s land and scouting department. . . . John F. Hornbeck, Vacuum Oil Co. scout, down from Midland. . . .John Z. Anderson. drilling contractor, ten years ago chief purchasing agent of the Gypsy Oil Co., at Tulsa. . . . Frank E. Miller, dealer in oil lands and leases, who has added a chain of drug stores to his business. . . . Houston Harte, publisher of San Angelo newspapers, who always pays direct attention to oil.

* * *

H. F. Gibson and F. Kirk Johnson, who discovered the Leck-Daugherty producing area in northern Winkler county, West Texas, more than a year ago, have transferred their offices from Abilene to Fort Worth. They are now established in the W. T. Waggoner building.

* * *

A salt water disposal company formed to handle brine produced with oil in the Salt Flat field of Caldwell county, near Luling, is headed by Hines H. Baker of the legal department, Humble Oil & Refining Co., as president. Joe H. Russell of the Gulf Production Co., Houston, and Alex Feild, Shell Petroleum Corp., Dallas, are vice presidents, Henry Arnold of the Humble at Houston is secretary-treasurer. Directors include Fred C. Sealey, assistant to the division manager of The Texas Co's. producing department at Houston and C. A. Abercrombie of J. S. Abercrombie, Inc., Houston.

* * *

W. E. Brock, of Chattanooga, Tenn., chairman of the board of directors of the Lucey Manufacturing Corp., has been appointed to the United States Senate to fill the vacancy created by the death recently of Senator L. D. Tyson.

* * *

I. R. Sheldon, geologist of the Atlantic Oil Producing Co., in the Wichita Falls district, was formerly indentified with the old Texhoma Oil & Refining Co., before its properties were acquired by the Continental Oil Co., of Main, several years ago. Mr. Sheldon is a familiar figure at geological and engineering group meetings in the petroleum industry of the southwest. His recreation is golf.

* * *

H. A. Hayes is manager of the newly organized Bald Hills Oil & Gas Co., formed in California to drill near Red Bluff, Tehama county. Associated with him are Benjamin Lerit, R. C. Nutt, Russell Irvine and Charles D. Black, all of Inglewood. Mr. Hayes is a graduate of the school of mines of the University of Nevada.

Wildcat Test Near Zwolle, La., Opens High Gravity Area

By Paul Wagner
N. P. N. STAFF WRITER

HOUSTON, Nov. 27

A LIGHT gravity oil well that came in for 1200 barrels daily, and was later estimated good for double its initial production, turned the eyes of the North Louisiana industry to Sabine parish this week.

The well is the A-1 test on the Bowman-Hicks Lumber Co. tract, in 34-8-12, four miles east of Zwolle, on the Many highway, in northern Sabine parish. It was drilled by R. L. Gay, trustee, for the account of himself and partner, Walter E. Cooke, of Paterson, New Jersey.

Completion depth was 2413 feet and the gravity of the oil tested 41.5 degrees, A.P.I.

Nearest commercial production is 12 miles away in the Blue Lake territory, southwest of Zwolle, where the Gay interests had about 300 barrels daily from three wells producing at chalk rock depths of 2130, 2176 and 2350 feet. The chalk rock oil tests about 44 degrees, A.P.I. gravity.

Northeasterly about 15 miles, in the Pleasant Hill territory, a few small wells have been drilled in the last two years in northern Sabine parish.

Standard Pipeline Co., Inc., subsidiary of the Standard Oil Co. of Louisiana, is connected to wells in the Blue Lake and Pleasant Hill areas, hence can serve the Zwolle discovery by extension of its gathering laterals.

Construction was begun immediately on a four-inch lateral of the Standard from Noble station, pending completion of which earthen dams were quickly thrown up across a nearby creek when the Zwolle discovery came in the night of Nov. 26. Lease tankage was also being rushed to the scene.

A fourth well of the Gay interests was completed in their No. 5 Bowman-Hicks, 7-14-7, Blue Lake district, the same day as the Zwolle discovery. It made a 25-barrel pumper at 2565 feet, offsetting the Blue Lake discovery of a year ago.

Offers of $50 an acre for leases a mile from the Zwolle discovery were being made the middle of the week. Most of the acreage in the territory belongs to such interests as the Bowman-Hicks Lumber Co., the Sabine Lumber Co., and the Long-Bell Lumber Co. For the most part, it is already leased; having been taken up before or after the small well discoveries in the Pleasant Hill and Blue Lake areas.

The general territory is on the southwest plunge coastward of the Sabine Uplift, which is the major structural feature on which De Soto-Red River and Caddo district fields of North Louisiana are located.

Surface bedding in the Zwolle region classifies as Wilcox formation, which disappears beneath the Claiborne contact 12 to 15 miles south of the present producing areas adjacent to Zwolle.

The Wilcox, Midway and Arkadelphia formations all exist in the territory. Test wells drilled in the general territory have established that these all have normal thicknesses in comparison with areas to the north in the direction of Shreveport, 65 miles away.

A thinning of the prolific Nacatoch horizon of the Shreveport-Caddo district has been logged in older tests drilled progressively southward to Sabine parish, where it has practically disappeared. The chalk rock formation of the northern area, however, persists into the Zwolle territory with a thickness of about 550 feet.

The Blossom zone of North Louisiana has also been logged in the area of the Blue Lake wells, but the Woodbine beds of the North Louisiana region were not found in tests on the Long-Bell Lumber Co. tract northwest of Zwolle.

I. R. Sheldon

New Completions Threaten to Boost California Crude Production

By Jack N. Westsmith
N. P. N. STAFF WRITER

LOS ANGELES, Nov. 30

A NEW crisis in California production is in prospect as a result of the prospective completion of a number of large wells in important flush fields notably Santa Fe Springs. In the first week of December crude output in the state may rise above 725,000 barrels per day, 75,000 barrels per day above the 650,000 barrel mark set as a reasonable figure in view of demand.

While this situation was arising the California industry was making progress in the formulation of agreements to limit production. Umpire Paul Grimm of the Santa Fe Springs field had his duties enlarged during the week by his appointment as arbiter for the Elwood and Ventura Avenue fields under the terms of new agreements.

Elwood operators have agreed to limit that field's production to 30,000 barrels daily average until Feb. 1.

A majority of Ventura Avenue operators are reported to have signed an agreement prorating gas production of that field to consuming outlet requirements and hence limiting crude production. Four of the six important interests are reported to have signed this agreement.

Umpire Grimm has written a letter to Santa Fe Springs operators pointing out the menace of drilling wells to proration in that field. In it he reported that 302 wells are drilling in the field and 238 are below the Meyer sand.

To keep a big surplus of oil from coming in at any one time Umpire Grimm is suggesting that drilling in all wells be suspended when casing is set on the sand. These would remain standing until conditions warrant bringing in new oil.

A schedule of completion dates was suggested by Mr. Grimm in his letter. This schedule would be worked out to give wells their due producing advantage.

In the week ended Nov. 28 Santa Fe Springs produced an average of 157,000 barrels per day. This average did not take into accounting about 16 new completions scheduled for Nov. 29 and up to midnight Nov. 30. In addition eight or 10 wells are swabbing for a production test. The outlook is for a production of upwards of 175,000 barrels per day in the first week of December.

The Machris Brothers, head of the Wilshire Oil Group have agreed to shut in three or four wells, including one or two wells on the Bandini lease. This lease is near the top of the structure and has a number of large producers.

Such action on the part of this large independent will facilitate curtailment. At present, the Machris interests claim they need more oil for their refinery and cannot afford to shut their wells in.

George F. Getty interests, another large independent, issued an order Nov. 26 to kill a 1700-barrel well and is reported to be making other plans to cooperate in curtailing production. Getty has six wells ready to be completed, three are on the crest of the structure and will undoubtly add 10,000 or 15,000 barrels to the field's output.

When Mr. Grimm was made umpire at Elwood Nov. 27 operators agree to suspend drilling operations at the earliest moment and remain shut down until Feb. 1. Offsets will be shut down for a specified time after the close of the agreement. Certain wells are to be completed and allowed to produce before Feb. 1 while others may be completed but not allowed to produce. Unjustified violations of the offset provisions call for a $100,000 penalty.

The action taken at Elwood was intended to prevent that field from reaching a daily production of 40,000 or 45,000 barrels. Tideland completions added from 3000 to 4000 barrels at a time and old wells maintained their output at a nearly constant level.

IN VENTURA Avenue the proposed agreement of operators sets up the total gas outlet of the field and each operator agrees to deliver his pro rata share of that gas. Allocation of gas is to be made by a managing committee which will have the right to check oil and gas production records of any signing company.

Well and lease potentials are to be set up on the basis of production tests and each lease given a pro rata share of the total outlet for the field.

Operating companies involved in the agreement are, Associated Oil Co., Shell Oil Co., General Petroleum Corp., Pacific Western Oil Co., Bolsa Chica Oil Corp., and M.K.T. Oil Co.

In the older field of Signal Hill, operators have pinched in their large producers and killed their small pumpers and, aided by few completions, are keeping production to less than 110,000 barrels.

Interested operators and companies in Kettleman Hills met Nov. 26 to carry out provisions of their agreement. Continental Oil Co. was named to distribute funds from the sale of oil produced from wells now open. Four petroleum engineers were appointed to determine the exact percentage to be distributed. They are Carl H. Beal, Independent; E. G. Gaylord, Standard Oil Co. of Calif.; Rick Templeton, Pacific Western Oil Co.; and A. H. Bell, Continental Oil Co.

AT PRESENT, Milham's discovery and Continental Oil Co.'s 12-8 are the only two of the four wells to be completed under the agreement that are producing. Standard Oil Co. completed its 11p-81, but is now deepening it to a lower producing horizon. Standard's No. 8 is drilling below 7300 feet in hard shale, and will not be completed for some time.

In accordance with the agreement, Pacific Western Oil Co. stopped work on its well in section 12 on the North Dome at 7433 feet. A string of 4¾-inch pipe has been run in and the hole filled with heavy mud to hold back the gas.

It has been decided to circulate mud rather than to put in a cement plug, so as to have greater control over gas pressure. A watchman will be kept on the well at all times to see that an excessive gas pressure does not build up and cause the well to blow in out of control.

Although the number of drilling permits issued during the past week in California for new wells totaled only 15 the total amount for the year up to Nov. 23 was 1181 as compared with 1110 for the same period last year.

Active drilling at Santa Fe Springs and Long Beach accounted for a large part of the new locations but excessive semi-wildcatting at Lawndale and Santa Barbara Mesa also

contributed its share of the increase.

Universal Consolidated Oil Co. completed its Blanchard 10 for 3500 barrels from a depth of 7850 feet under a 1½-inch bean, and Richfield boosted its total by completing Howard 5 for 4000 barrels of oil and 5 million cubic feet of gas from a depth of 8103 feet. The well is now carrying a tubing pressure of 210 pounds and a casing pressure of 975 pounds.

Among the other wells completed during the last half of the second two-week period, that is from November 27 to November 30 were the following: Commodore Oil Co.'s Landel No. 4 at 7972 feet for 1860 barrels. General Petroleum Corp.'s S. F. 145 D and 189 C for 1600 barrels and 1000 barrels from 6224 feet and 7920 feet respectively. General Petroleum also completed its Jalk 114 for 1600 barrels from 8095 feet.

Shell Oil Co., at latest reports, was swabbing its G. H. & N. No. 21 with the bottom of the hole at 7982 feet and will make a production test before midnight Nov. 30 on its Slusher No. 14, bottomed at 7904 feet. Both of these wells will be recompletions.

Associated Oil Co. was unable to make its Prairie 1 in the Potrero field flow and will put it on the compressor. The hole is bottomed at 3844 feet and is reported to have had a fair showing of oil sand.

A production test is expected soon at Potrero in Globe Lease and Royalty Co.'s No. 6 drilling out the cement at 3839 feet and in York Lockhardt Oil Co.'s No. 2 drilling out at 3805 feet.

Oscar Howard, an Independent operator at Santa Fe Springs is reported to be below 9100 feet in his Hathaway No. 7 and to have picked up some good looking oil sand. No information is being given out at present, due to false rumors that had been circulated at the first of the week. If this well is completed at its present depth it will be the deepest producer in the world. It is at present the deepest drilling rotary well as Shell Oil Co.'s Nesa 11 at Long Beach is now suspended after having drilled to 9280 feet.

It is expected that a production test will be made of all or part of the hole during the coming week, as it is known that considerable good looking oil sand has been penetrated at various depths. The well is on the extreme southwest flank of the field and will clearly demonstrate what may be expected from the lower Clarke sand on the outskirts of the field.

General Petroleum Corp. is to shut in its Ochsner 2 on section 26 on the North Dome of Kettleman Hills. After a number of long fishing jobs, the crew has finally run a 4¾-inch oil string to 7264 feet including 543 feet of perforated tubing. General Petroleum's well No. 2 on section 20 is drilling below 7116 feet and will be continued to the top of the oil sand before operations are suspended, to conform to the Kettleman Hills conservation agreement.

Chanslor-Canfield Midway Oil Co. will drill out the cement in its Sahlein 1 on section 28 on the South Dome of the Kettleman Hills. Several slight showings of oil and gas were encountered and the executives of the company are taking no chances of passing up a producing sand. This well is about a mile from Ohio Oil Co.'s Smith well which came in several weeks ago flowing hot salt water, and although the Sahlein is bottomed at only 4334 feet, while Ohio's test was below 7000 feet, all likely looking sands will be tested.

Santa Fe Springs Output At 175,000 Bbls.

(By Telegraph)

LOS ANGELES, Dec. 3.—Santa Fe Springs production, estimated at 171,131 barrels for Nov. 30, and at 174,212 barrels Dec. 1, is not expected to exceed this amount during remainder of period.

Umpire Grimm in report No. 2 on the Santa Fe Springs announces potential production Dec. 1 to 15 as 280,904 barrels, allotted production for same period is 150,003 barrels, allowable production for same period as 145,071, total allowable production for same period as 2,176,065 barrels, excess production for period Nov. 15 to 29 as 4932 barrels and total excess production for same period 73,972 barrels.

In some instances where an operator has shown too great an excess and yet is trying to obey the orders the umpire has wiped the slate clean and is starting period Dec. 1 to 15 anew.

Oil company executives are working out a plan whereby oil field workers will be employed four or five days only in each week so that nearly all workers will have some work. It is estimated that more than 2000 men have been laid off in California oil fields since curtailment became effective Nov. 1.

Signal Hill Fire Destroys 5 Derricks, 10 Tanks

LOS, ANGELES, Nov. 29.—Fire in the Signal Hill field, Nov. 26, was finally brought under control, after destroying five derricks and ten oil storage tanks. It was estimated that the loss would be approximately $60,000. But for prompt action on the part of firemen and oil workers the loss probably would have been far greater.

The burned derricks were those of Bud Gerner No. 1, South-Basin-Davis MacMillan No. 1, Davis-MacMillan No. 9, Petroleum Securities Davis-MacMillan No. 1 and Conductor Oil Co.'s No. 1. The tanks were the property of Conductors Oil Co., the Jergins Synd., Davis-MacMillan Oil Co. and the Soverign Oil Co.

Two men were burned, one critically, in an explosion that accompanied the fire. This explosion threw burning oil over the tank farm and greatly hindered fire-fighting operations. The fire is thought to have resulted from failure of a tank seam, which allowed oil to seep out on the ground where it came in contact with a boiler and was ignited.

Changes Are Made in Wilmac Board

TULSA, Nov. 30.—Dr. J. H. Miller and Robert H. Wood have resigned as directors of the Milmac Oil Co. and their places have been filled by the election of F. A. Douglass, Fort Worth and O. K. Detrick, Okmulgee.

Paul McCune has been elected president, succeeding Max W. Ball, who has become chairman of the board. Other officers are F. L. Michaels, Jr., vice-president; O. B. Swanson, secretary and treasurer and Winifred E. Drach, assistant secretary and treasurer.

Directors are Max W. Ball, Paul McCune, F. L. Michaels, Jr., O. B. Swanson, F. A. Douglass, H. C. Detrick and O. K. Detrick.

The advisory committee, which decides all matters of policy with respect to purchase and sale of properties, consists of W. E. Wrather, geologist and engineer, Dallas, Paul McCune and Max W. Ball.

The company will move its executive offices from Tulsa to Fort Worth on Jan. 1. It will continue to maintain offices in Tulsa and Denver.

Petroleum Could Help End War, Says Hurley

CLEVELAND, Dec. 2.—Petroleum, along with other raw materials, can be used to abolish war, so Edward N. Hurley, wartime chairman of the United States Shipping Board, has written to M. Georges Theunis, of Belgium, president of the International Chamber of Commerce. Mr. Hurley wants consideration of his plan at the next Chamber meeting.

Leaders in a position to control such materials as petroleum, tungsten, news print, chromium, iron ore, coal, rubber, manganese, and mercury, could refuse to allow these to be used for war purposes he said. Representatives of our industry Mr. Hurley has suggested, who could be instrumental in such a plan are Walter C. Teagle, president of the Standard Oil Co. of New Jersey, and Sir Henri Deterding, managing director of the Royal Dutch Shell Corp.

Completions in Oklahoma and Kansas, Week Ended November 30, 1929

OKLAHOMA

Carter County

Company	Well No.	Location	Depth	Init. Prod.
Carter	8	SE SW NW 30-1-3 W	2501-2640	37M
Magnolia	4	SW NE SE 23-1-3 W	2280-2582	305
Arclow	1	NWc SE 35-4-2 W	T.D. 4810	Dry

Cleveland County

Sooner	1	C SW 15-7-1 W	T.D. 3120	Dry

Cotton County

Shasta	8	CSL N½ NE 2-2-10 W	2148-2167	160
Shasta	3	CNL S½ NE 2-2-10 W	2134-2145	130
Shasta	1	NEc SW 1-2-10 W	2230-2235	45
Razor-Aikens	2	CEL SE SW 35-1-10 W	2147-2169	20

Creek County

Foster et al	1	NWc NE SW 25-19-8 E	2354-2393	145
Jackson-Wise	1	NEc SE SE 20-18-9 E	2849-2854	OWD 260
Troy	13	C N½ NE 2-15-11 E	1773-1808	15
Atlantic	1	SWc NW NE 16-14-10 E	3343-3351	30
Shaffer	1	NEc 16-15-8 E	T.D. 3330	Dry

Grady County

Magnolia	4	SE NE NE 28-3-5 W	1885-1900	15
Magnolia	9	SW SE NE 35-5-8 W	2195-2396	10M

Hughes County

Whitney	1	SEc SW 17-5-9 E	T.D. 3995	Dry

LeFlore County

LeFlore County	92	NE SE NE 19-7-27 E	1410-1682	⅞M
LeFlore County	3	SE SE SE 28-7-26 E	1524-1700	1¼M

Lincoln County

Blackwell	1	SE SW NW 25-17-3 E	3895-3905	½M

Marshall County

Carter	1	SEc SW NW NW 30-5-6 E	601-644	20
Goddard	1	SW SW SW 13-5-5 E	515-532	100

Muskogee County

Babcock Bros.	1	SE SW NE 8-15-15 E	1640-1647	30 OWD
Wilson-Barnes	2	SE NW SW 13-13-18 E	T.D. 735	Dry

Okfuskee County

Champlin	10	NEc NW 22-11-11 E	3490-3502	140
Robinson et al	6	C SE SW 35-11-9 E	1481-1487	12

Okmulgee County

Elm	2	NWc SW NE 24-14-14 E	500-518	1/10M
Selby	1	SE NE NW 26-14-14 E	954-988	60
Gardiner	1	C SE SE 15-14-13 E	T.D. 1978	Dry

Osage County

Jennings	2	SW NW SW 32-29-12 E	T.D. 1042	Dry
Petroleum Drlg	1	NWc SW 31-25-8 E	T.D. 2885	Dry
Winona	8	CEL W½ NE 20-29-9 E	1548-1578	80
Osage	396	SEc SW NW SW 29-28-11 E	1839-1878	¾M

Pawnee County

Sears et al	6	CNL NE NW 35-20-9 E	1985-2060	70
Kerr et al	1	NW SW NW 21-20-9 E	T.D. 2802	Dry
National Ref	2	CSL SW SW 36-20-9 E	T.D. 2822	Dry

Payne County

Magnolia	2	SEc NW 27-19-4 E	3393-3450	10

Pontotoc County

Benedum-Trees	1	NE SW NW 31-5-5 E	2487-2661	150

Pottawatomie County

Magnolia	1	NE NW SW 22-7-4 E	3585-3650	13M
Magnolia	4	SW NE NW 22-7-4 E	4265-4275	1155 OWD
Pure	1	NW NE NW 21-7-4 E	4198-4230	430
Superior et al	2	NE SE NW 19-6-4 E	T.D. 3685	Dry
Superior et al	1	SE NE NW 19-6-4 E	T.D. 3806	Dry
Deignan et al	1	CWL SE SW 18-6-4 E	T.D. 3944	Dry
Empire	2	NE SE SE 17-7-4 E	T.D. 4239	Dry

Seminole County

Superior-Magnolia	1	NE NW NW 9-7-7 E	T.D. 4278	Dry
Twin State	3	CNL S½ 6-8-6 E	T.D. 4340	Dry
McCullough et al	1	NEc NW 28-10-5 E	T.D. 4904	Dry
Sinclair	2	SWc NW 24-5-7 E	2390-2400	25M
Pure	2	SW SE NE 13-6-7 E	4167-4181	1935
Cont.-Shaffer	6	NW SW SW 4-7-7 E	4160-4170	680
Cont.-Shaffer	5	SWc 4-7-7 E	4169-4172	300
Magnolia	3	SE NW SE 18-9-6 E	4308-4324	1560
Magnolia	11	SW NE SW 18-9-6 E	4355-4360	10
Gypsy-Devonian	7	NE SE SE 18-9-6 E	4212-4225	755
Mid-Continent	1	SEc SW 7-9-6 E	4275-4287	590
Prairie et al	2	NE NW NW 5-9-6 E	4328-4348	345
Gypsy	1	SEc 31-10-6 E	4090-4100	60

Sequoyah County

Citizens	1	CWL SW SE 33-12-27 E	1170-1212	13/20M

Stephens County

Magnolia	6	NW NE SE 13-2-8 W	1935-1940	40
Ven-Mex et al	8	SE NE NW 34-1-8 W	2239-2242	10
Heydrick et al	1	SEc SW 5-1-8 W	T.D. 2507	Dry

Woodward County

Farrand	2	CSL SW SE 2-23-17 W	T.D. 1385	Dry

Wagoner County

Creekmore-Morrison	1	NWc 28-18-16 E	665-678	¼M

KANSAS

Butler County

Alladin Pet	1	NEc SE 20-26-7 E	2734-2742	18

Coffey County

Hines et al	1	NWc SW NW 7-23-15 E	1587-1597	10

Elk County

Minnehoma-Murphy	2	NWc SW SW 3-31-8 E	1983-2000	200 OWD
Mann et al	1	SWc SW 6-31-9 E	T.D. 2395	Dry

Greenwood County

Dixie-Amerada	3	NEc NW NW 27-23-11 E	1948-1952	50
Empire	2	NWc SE NE 22-22-12 E	1715-1727	20

Harper County

Slick-Jarrett et al	1	NWc NW 19-32-6 W	T.D. 5125	Dry
Slick et al	1	SEc SE 13-34-8 W	T.D. 5312	Dry

Reno County

Milmac	1	SWc NW 17-26-5 W	T.D. 4026	Dry

Russell County

Pryor-Lockhart et al.	1	NWc SE 36-15-13 W	3344-3347	185

Sedgwick County

Texas	1	SEc NW SW SW 21-28-1 E	T.D. 3542	Dry
Barnsdall	1	NEc NW 24-25-1 E	T.D. 3720	Dry
Graham Bros.-Shell	1	SEc SW SW 15-26-2 E	2938-2939	136
Bu Vi Bar	2	NEc NW NE 12-26-1 W	3363-3367	549
Bu Vi Bar	5	SEc SW SE 1-26-1 W	3355-3359	582

Sumner County

Continental	2	SWc SW 23-34-2 E	3516-3522	50

Completions in California, Week Ended November 23, 1929

Elwood

Company	Well No.	Location	Depth	Init. Prod.
Spalding, Caroline	Permit 93-1	....	3701	3450
Pacific Western Oil Co.	Goleta 1	....	3683	4220

Long Beach

Donely Oil Co	Barteaux 1A	....	6756	....

Mt. Poso Creek

General Pet. Corp.	Glide 16	....	1635	4217

Santa Fe Springs

Company	Well No.	Location	Depth	Init. Prod.
Commodore Pet. Corp.	Babbonett 4	....	8000	1800
Standard Oil Co.	Koontz 11	....	8047	345
Standard Oil Co.	Walker 18	....	7947	250
The Texas Co.	Foix 5	....	6234	921
The Texas Co.	Steinly 5	....	7930	2400
The Texas Co.	Wickman 4	....	6826	70

Seal Beach

Continental Oil Co.	Bixby 31	....	5500	590

New Field Operations in Oklahoma, Kansas, North, North Central, East Central, Panhandle and West Texas, Week Ended November 30, 1929

OKLAHOMA

Carter County

Company	Well No. & Farm	Location	
Magnolia	5-Anderson	NWc 23-1-3 W	

Cotton County

Shasta	10-Slogan	CNL NW NE 2-2-10 W	
Shasta	1-Indian	NWc SE 1-2-10 W	
Franklin	7-Chambers	SWc SE 35-1-10 W	
Franklin	6-Chambers	CWL SW SE 35-1-10 W	

Creek County

Phillips et al	3-Koch	NWc SW NE NE 20-19-9 E	
Texas Pacific	1-Harjoche	SEc NE 21-17-9 E	OWD
Ted Ray Oil Co.	1-Smiles	SWc NE NE 13-17-10 E	OWD
Buckles et al	1-King	C SE SW 18-17-10 E	
Reserve	1-Davis	SEc SW 3-16-10 E	
Shaffer et al	4-Lewis	NWc SW SW 10-15-8 E	
Logan-Kistler	2-Harjo	SWc NW NW 27-14-10 E	

Garvin County

Magnolia	6-Harris	SE SW NW 16-1-3 W	OWD

Grady County

Magnolia	4-Dryden	NEc NW NE 35-5-8 W	
Magnolia	5-Heatley	NWc SW NE 2-4-8 W	

Kiowa County

Burke	1.....	NW NW SW 4-6-16 W	
McWhirter et al	2-Menton	NEc SW SW NW 4-6-16 W	
Russell-Sloan	1-Weidel	NW SE NE 32-7-16 W	
Adams	2-Brazel	SWc NE 34-7-17 W	

Marshall County

Company	Well No. & Farm	Location
Goddard	2-McComas	SW SW SW 13-5-5 E
Bilbo	2-Taliaferro	SEc SW NE NE 14-5-5 E
Bilbo	1-Null	SEc NW NW 24-5-5 E
Merrick	1-Null	NWc 24-5-5 E
Carter	2-Davidson	NEc SW NW NW 30-5-6 E

Muskogee County

Sessions et al	1-Pickard	SEc SW 29-13-19 E	
Davis et al	1-Agnew	NWc SW SE 12-13-18 E	
Babcock Bros.	3-Barnett	CEL W½ NE 8-15-15 E	OWD
Parks	1-Jefferson	SEc NE NE SW 7-15-15 E	

Noble County

Midco	2-Smizer	NW NE NE 21-24-1 W	

Okfuskee County

Moffett et al	4-Simmers	SWc NW NW 8-11-12 E	
Schoenfeldt et al	5-Hawkins	SEc NE SW 4-11-12 E	
Summitt Drlg	1-Jefferson	SEc SW 23-11-11 E	
Independent	2-Wilson	SEc SW NW 22-12-11 E	
Mid-Continent	1-Phillips	NEc SW 32-12-10 E	
Tidal et al	1-Barnett	SEc NE NE 30-12-9 E	OWD

Oklahoma County

Skelly	2-Hoopes	SW NW NE 31-11-2 W	
Slick et al	1-Hoopes	NW SW NE 31-11-2 W	
Ben Head Jr.	1-Community	SW NW SE 34-11-3 W	
Coline	8-Olds	C NW 24-11-3 W	

(*Continued on Page 71*)

New Field Operations in Oklahoma, Kansas, North, North Central, East Central, Panhandle and West Texas, Week Ended November 30, 1929

(Continued from Page 70)

Okmulgee County

Company	Well No. & Farm	Location	
Martin et al	2-Silpee	SWc NE NW NW 20-12-13 E	
Rebold	1-Scotty	NWc SE 6-15-13 E	OWD
Devonian	1-Jones	SEc NW 6-15-13 E	OWD
Rebold	1-Sugar	NWc SW 5-15-13 E	

Osage County

Sterling	17	SWc 12-21-11 E	
Oliphant	5	NEc SW NW 6-23-9 E	
Silurian	58	SW SW NW 17-23-12 E	
I. T. I. O.	325	SE NE NE 14-23-8 E	

Pawnee County

Chamberlain	2-Coats	CSL SW NW 26-20-9 E	
Thompson-Black	1-Mote	NE SW SW 14-20-9 E	

Pontotoc County

Denver Prod. & Ref.	2	NE SE NE 36-5-4 E	
Independent	2-Davis	SE NW SW 19-5-5 E	
Texas Pacific	3-Hatcher	NW NE NE 30-5-5 E	

Pottawatomie County

Anderson et al	1-Townlot	NE SW NW 8-9-5 E	
Dillon Dev	1-Townlot	SE SW NW 8-9-5 E	
Keister-Manning	1-Rowlett	SE SW NE 30-8-4 E	
Texas	1-Lynn	SEc 20-7-4 E	

Seminole County

Gypsy	2-Taylor	NE SE SW 19-9-6 E	
Amerada et al	1-Brown	SE NE NE 22-9-5 E	
Gypsy	12-Hulhoke	SE SW SE 14-7-6 E	OWD
Mid-Continent	5-Harjo	SW SE NE 14-5-7 E	
Harris	2-Harjoche	NE SE SE 8-6-6 E	
Wofford Drlg. et al.	1-Davis	SEc NW 29-8-7 E	
Pure	13-Cotcha	NE NW NE 23-7-6 E	
Barnsdall	1-Cotcha	NWc NE 23-7-6 E	
Carter	2-Chowning	NW SW SW 19-9-6 E	
Champlin-Empire	1-Skinner	SW NW SW 9-6-6 E	
McCullough	1-Snyder	SE SW NE 8-6-6 E	

Stephens County

Medlin et al	1-Brown	CSL N½ S½ NW 19-2-7 W	

Tillman County

Allen Bros	2-Howell	CSL N½ SE 13-1-17 W	

Tulsa County

Union Drlg	2-Anthis	NEc 13-19-10 E	

Wagoner County

Martin et al	1-Berryhill	NEc SE 27-18-15 E	
Sherer	1-Posey	NWc SE NE 5-17-18 E	OWD

KANSAS

Butler County

Empire	13-Cranston	NEc SE 22-27-5 E	
Garden et al	5-Sluss	NEc NW NW 6-27-6 E	
Phillips	5-Tatum	SEc NE NW 9-27-6 E	
Pyle-Sutter	1-Smith	SEc NW SE 34-28-6 E	
James et al	1-Piatt	NEc NW NW 31-23-6 E	

Chase County

Palhamus et al	3-Leidy	SWc SE 25-22-9 E	

Cowley County

Fine et al	1-Brown	SEc SE 8-32-4 E	

Ellis County

Phillips	2-Sophus	SEc SW NE 9-13-19 W	
Midwest Explor	24-Austin	SEc NE NE 36-12-16 W	

Greenwood County

Independent	1-Lazier	SWc NW SE 36-24-10 E	
Phillips	1-Patterson	SWc SE SW 22-23-11 E	

Reno County

McBride et al	1-Bacon	SWc NE SW 36-23-5 W	
Tatlock-Shell et al.	1-Tonn	C NW NW 17-25-4 W	

Rice County

Vickers	1-Binger	NWc SE 21-20-10 W	
Tatlock et al	1-Ralston	SWc SW 25-19-8 W	

Russell County

Midwest Explor	6-Gorham	NWc NW 9-14-15 W	

Sedgwick County

Texas	2-Robbins	NEc SW SW 21-28-1 E	
Bu Vi Bar et al	9-Carr	SEc SW NW SE 1-26-1 W	

TEXAS

NORTH CENTRAL & EAST CENTRAL

Brown County

Company	Well No. & Farm	Location	Survey
Praskey et al	1-Evans	Blk-620	Woodward
Brisk-Roberts	2-Richardson	.....	SA&MG
Smith	21-George	.....	Chaddick
Texas	5-Johnson	.....	Nix
Phillips	1-Willis	Blk-157	ET
Humble	2-Martin	Sec-11	HT&B
Cranfill-Reynolds et al.	2-McDonald	Blk-60	Carrier

Callahan County

Texas	3-Finley	Sec-75	BOA
Kleiner	1-Morris	Sec-141	GH&H
Ducker	1-Seals	Sec-30	BBB&C
Boiley-Manhill	4-Williams	Sec-139	Univ.

Coleman County

McCamey et al	3-Sealy et al.	Sec-35	GH&H
Mitchell-Graves et al.	1-Wilkerson	Blk-720	Willey
Willmott	1-Baker	Sec-95 Blk-275	Hunt
Simpson-White-Pinkerton	1-Wells	Sec-15 Blk-751	Martinez
Sammels	3-Robertson	Blk-224	Votan

Delta County

Delta County Dev.	1-Hays	.....	Henderson

Eastland County

Harbin	1-Harbin	Sec-15 Blk-2	H&TC
Gholson	3-Fox	Lot-28 League-2	McLennan Co. Sch. Ld.

Erath County

Flitcher-Moore	1-Smith	Lot-6	Bishop
Flitcher-Moore	2-Cage et al.	Lot-5	Bishop

Fannin County

Imperator	1-Owens	.....	Crenshaw
Erwin Prod	1-Barling	.....	Smith

Hill County

Harper-Laston	4-Jones	.....	Graves
Judge Batts et al.	2-Holderman	.....	Sullivan

Jones County

Company	Well No. & Farm	Location	
Continental	1-Phillips	Sec-16 Blk-19	T&P

Limestone County

Jensen-Baggett	1-Richardson	.....	Bridgeman
Why Not Oil Co. & 44 Oil Co.	Rhea	.....	Varela

Rusk County

Magnolia	1-Dean	.....	Loller

Shackleford County

Hart-Wright	2-Clark	Sec-2	BAL
Moutray	3-Nail	Sec-40	ET

Smith County

East Texas Prod.	1-Kadane	.....	McFadden

Stephens County

Lone Star	3-Brooks	Sec-54	T&P
Lone Star	3-Calloway	Sec-2 Blk-C	SP
Lone Star	1-Elliott	Sec-1 Blk-C	SP

Throckmorton County

Cranfield-Reynolds	5-Lee	Sec-198	BBB&C

Van Zandt County

Shaw	1-Huddle	.....	Richardson
Central	1-West	.....	Walters
Pure	1-Thompson	.....	Gross
Pure-Shell	2-Tunnell	.....	Gross
Pure-Shell	1-Tunnell	.....	Gross

NORTH TEXAS

Archer County

Stumpf	2-Ford	.....	Myers
Cline	1-Harckey	Blk-27	Meade
Duke et al	1-Richardson	Sec-1425	TE&L
Douglas	5-McClure	Blk-13	Crawford
Reeder et al	6-Kunkel	Sec-3	BBB&C
Moran Drlg. et al.	3-Scott	.....	James
Junker-Perkins	1-Schlagel	Sec-2	BBB&C

Baylor County

Grisham-Barnsdall	1-Portwood	Sec-1574	TE&L

Clay County

Sazet	1-Stine Est.	Blk-2	Parker Co. Sch. Ld.
Merrick-Goldsmith	2-Byers Bros.	Blk-15	Byers Bros
Sazet	1-American	Blk-3	Parker Co. Sch. Ld.

Cooke County

Atkins	1-Daugherty	.....	BBB&C
Lloyd	7-Wheelock	.....	Underwood
Lloyd	7-Wheelock	.....	Underwood

Denton County

Sherke et al	1-Hughes	.....	Morton

Wichita County

Everts-Jamison	2-Gibson	Blk-302	Waggoner
Harris-Peckham	1-Daume	Sec-1	SP
Wilson Drlg. et al.	1-Griffin	Blk-6	Spillers

Wilbarger County

Cosden Inc.	D6-Waggoner	Sec-35 Blk-2	H&TC
Davis	4-Waggoner	Sec-35 Blk-2	H&TC
Empire	A19-Waggoner	Sec-32 Blk-4	H&TC
Empire	B26-Waggoner	Sec-32 Blk-4	H&TC
Empire	B27-Waggoner	Sec-32 Blk-4	H&TC
Empire	B28-Waggoner	Sec-32 Blk-4	H&TC
Texas	368-Waggoner	Sec-5 Blk-13	H&TC
Moore	1-Waggoner	Sec-106 Blk-14	H&TC
Texas	367-Waggoner	Sec-16 Blk-13	H&TC
Texas	369-Waggoner	Sec-1	TC

Young County

Parks et al	3-Cullers	.....	Stinnett
Wise-Porterfield	3-Cullers	.....	Stinnett
Texas	1-Hoffman	.....	Averett
Goldsmith-King	6-Kunkel	.....	Stell
Sun	15-Kunkel	Sec-4	BBB&C

PANHANDLE

Carson County

Ryan Consolidated	7-Block	Sec-111 Blk-4	I&GN

Gray County

Shamrock	3-Saunders	Sec-3 Blk-1	ACH&B
Tripplehorn et al.	1-Morse	Sec-17 Blk-A-9	H&GN

Wheeler County

Lone Star	1-Simms	Sec-103 Blk-23	H&GN

WEST TEXAS

Howard County

Simms	2-Clay	Sec-127 Blk-29	W&NW
Ward	21-Roberts	Sec-137 Blk-29	W&NW
Empire	4-Clay	Sec-127 Blk-29	W&NW
Godley	17-Hooks	Sec-140 Blk-29	W&NW

Menard County

Cromwell-Duffy et al.	1-Winslow	Sec-36	T&NO

Mitchell County

California	8-Foster Lse-I	Sec-6 Blk-29	T&P

Pecos County

Walsh et al	1-Stockton Cattle Co.	Sec-32 Blk-11	H&GN
Walsh et al	1-Hollingsworth	Sec-24 Blk-11	H&GN
Landreth Prod.	6-Univ.	Sec-13 Blk-18	Univ.
Landreth Prod.	5-Univ.	Sec-13 Blk-18	Univ.
Landreth Prod.	4-Univ.	Sec-13 Blk-18	Univ.
Gulf Prod	26-Yates	.....	Runnels Co. Sch. Ld.
O'Neal et al	1-Winfield	Sec-1 Blk-132	T&ST&L
Beull-Hagen	1-Byran	Sec-54 Blk-10	H&GN
Freeman-Miller	1-Pecos Valley	Sec-36 Blk-3	H&TC
World	2-Univ.	Sec-31 Blk-16	Univ.
Batezna	1-Bellgrade Cattle Co.	Sec-34 Blk-11	H&GN
Anna Belle	1-Hollingworth	Sec-24 Blk-11	H&GN
Gulf Prod	22-Smith	Sec-22 Blk-194	TC
Cosby et al	3-Smith	Sec-24 Blk-194	TC

Sterling County

Fuhrman	1-Cole	Sec-10	Cole & Reed

Upton County

Texon-Continental	2-Sherk	Sec-35 Blk-1	MK&T

Winkler County

Bashara et al	2-Bashara	Sec-17 Blk-B-3	PSL

Completions in Texas, Week Ended November 30, 1929

NORTH CENTRAL & EAST CENTRAL

Anderson County

Company	Well Farm	Survey Sec. & Blk.	Depth	Init. Prod.
Humble	4-Smith	Roberts	3658-3682	27
Magnolia	1-Williams	Bledsoe	T.D. 3920	Dry
Humble	2-Purvey	Clark	T.D. 3503	Dry

Brown County

American Maracaibo	2-Cross	Honeycutt Blk-623	T.D. 1142	Dry
Buder	7-Kesler	Kesler Sec-42	T.D. 1370	Dry
Buder	8-Kesler	Kesler Sec-42	T.D. 1386	Dry
French et al	1-Hayes	CT Sec-43	T.D. 1037	Dry
Herring	1-Burnett	HT&B Sec-43	T.D. 1463	Dry
Smith	11-George	Chaddick	T.D. 1335	Dry
Tex-Cal	3-Martin Heirs	HT&B Sec-11	T.D. 1016	Dry
Buder	7-Munselle	Azenbeck Blk-3	1190-1220	25
Humble	1-Martin	HT&B Sec-11	971-974	15
Texas	11-Kesler	Kesler Sec 42	1269-1288	114

Callahan County

Lillins et al	1-Burman	Cherry	365-367	1½M

Coleman County

Smith	7-Morris	Woods Blk-483	1987-2015	300
Vacuum et al	4-Weaver	Gabel Sec-16 Blk-271	1842-1844	256
White Eagle	28-Morris	Webber Sec-26 Blk-722	2000-2030	200
Cunningham et al.	1-Campbell	Martinez Sec-14 Blk-751	T.D. 1401	Dry
Dallas	1-Babbington	Rose Blk-79	T.D. 1100	Dry
Dozier-Humphrey	2-McAdams Bros.	Shanks Blk-243	T.D. 1093	Dry
Magnolia	23-Morris	Davidson Blk-80	T.D. 2927	Dry
Morrison-St. St. John	2-Eddington	Victoria Co. Sch. Ld. Sec-187	T.D. 1135	Dry
Prasky et al	1-Strozier	Gabel Sec-22 Blk-271	T.D. 1902	Dry
Tower-McKanna	1-Slack	Merritt Sec-7 Blk-256	T.D. 2623	Dry

Comanche County

Owens Inc. et al.	1-Mathis	Sullivan	T.D. 903	Dry

Eastland County

Texas	5-Cook	Lewis	T.D. 2510	50
Lobough et al	1-Ramsey	H&TC Sec-52 Blk-4	1651-1658	2M

Falls County

Groover et al	1-Westbrook	Acosta	923-927	2

Grimes County

Derring et al	1-Freund	O'Conner	T.D. 3007	Dry

Hill County

Harper-Laston	3-Jones	McDonald	T.D. 837	Dry

Jack County

Harper et al	1-Ezell	Hughson	3135-3146	400

Milam County

Burkhead	1-Weighman	Pollard	T.D. 1980	Dry
Chapman et al	2-Johnson	Acosta	T.D. 2212	Dry
Chapman et al	1-Hollman	Liendo	T.D. 2205	Dry

Palo Pinto County

Neeley-Hulbert	1-Neal	Collingsworth Sec-14	T.D. 4418	Dry

San Saba County

Tyler et al	1-Winkler	Germain Emigration Co. Blk-626	T.D. 1325	Dry

Shackleford County

Callahan-Carter	1-Hatcher	BAL Sec-17	T.D. 1005	Dry
Campbell et al	1-Hennessey	T&P Sec-68 Blk-13	T.D. 1724	Dry
Engle Bros	5-Mathews	ET Sec-29	T.D. 1260	Dry
Moutray	2-Nail	ET Sec-40	T.D. 808	Dry
Frizzell-Smalley	2-Alexander	TE&L Sec-580	894-896	15
Grisham-Hunter	4-Davis	T&P Sec-20 Blk-13	1640-1655	12
Midwest Explor	3-Davis	T&P Sec-13 Blk-12	1510-1511	20
Southern Pet. Explor.	6-Dyer	T&P Sec-84 Blk-12	929-940	12
Texas Cons	4-Reynolds	T&P Sec-23 Blk-11	950-952	4
Dull-Earl	3-Mathews	ET Sec-32	1158-1163	260

Stephens County

Ash Synd	1-Hart	T&P Sec-22 Blk-4	T.D. 3912	Dry

NORTH TEXAS

Archer County

Goldsmith-King	3-Kunkel	BBB&C Sec-4	1158-1161	224
Moran-Golding-Cochran	1-Brown	Meade Blk-4	1426-1428	40
Panhandle	4-Matlock	Dorsey	670-674	2½
Young et al	1-Taylor	SP Sec-1	1760-1763	11
Petroleum Prod.	B13-Kunkel	BBB&C Sec-3	1141-1144	25
Cline et al	1-Hayter	TE&L Sec-2323	T.D. 1481	Dry
Gardner Bros	1-Hamilton	BBB&C Sec-8	T.D. 1352	Dry
Goldsmith-King	4-Kunkel	Stell	T.D. 1171	Dry
Gwynn	8-Thompson	ATNCL Sec-20 Blk-16	T.D. 1598	Dry

Baylor County

Consolidated	1-Portwood	TE&L Sec-1281	1408-1416	42

Clay County

Merrick-Goldsmith	1-Byers	Byers Bros. Sec-15	1017-1019	16
Art et al	1-Byers	Byers Bros. Sec-16	1015-1017	62

Cooke County

Danciger	14-Huggins	SP	1075-1116	96
Lloyd	B2-Wheelock	Underwood	T.D. 1808	Dry
Petroleum Prod.	1-Price	Moore	T.D. 1925	Dry

Foard County

Company	Well Farm	Survey Sec. & Blk.	Depth	Init. Prod.
Humble	1-Johnson	SP Sec-37 Blk-L	T.D. 5003	Dry
Wichtex	1-Johnson	H&TC Sec-44 Blk-18	1378-2145	4

Wichita County

Hiland	1-Burns	DCSL League-4 Blk-5	1808-1813	46
Sheldon-Jamison	1-Valkhart	Waggoner Sec-309	1921-1930	130
Bridwell	5-Burnett	HT&B Sec-3	T.D. 1931	Dry
Ryan	111-Nance	Fowler	T.D. 512	Dry
Underwood Drlg.	1-Boyd	DL&C Blk-14	T.D. 1852	Dry

Wilbarger County

Proctor	1-Waggoner	H&TC Sec-41 Blk-4	T.D. 2423	Dry
Shaw	H1-Waggoner	Butler	T.D. 2403	Dry
Texas	366-Waggoner	H&TC Sec-7 Blk-13	T.D. 1543	Dry
Dixie	F1-Waggoner	H&TC Sec-4 Blk-4	T.D. 1967	Dry
Fain-McGaha	AA4-Waggoner	H&TC Sec-18 Blk-4	2408-2412	75
Fain-McGaha	GG1-Waggoner	H&TC Sec-8 Blk-4	2334-2445	15
Empire	B23-Waggoner	H&TC Sec-32 Blk-4	2297-2304	125
Fain-McGaha	W19-Waggoner	H&TC Sec-32 Blk-4	2293-2294	165

Young County

Goldsmith-King	5-Kunkel	Stell	T.D. 1171	Dry
Pennell et al	1-Logan	YCSL Blk-24	T.D. 805	Dry
Perkins	1-Patterson	TE&L Sec-185	T.D. 1085	Dry
Pandem	1-Burch	TE&L Sec-477	T.D. 4333	Dry
Campbell-Underwood Drlg.	2-Campbell	TE&L Sec-1376	901-903	10
Goldsmith-King	3-Kunkel	Stell	1147-1154	150
Holbrook-Woods	5-Dean	YCSL Blk-19	494-498	5
Sun	13-Kunkel	BBB&C Sec-4	1147-1158	200

PANHANDLE

Carson County

Texas	4-Lewis	I&GN Sec-115 Blk-4	3027-3130	85
Stubblefield-Shell	1-Jordan et al.	I&GN Sec-104 Blk-4	3070-3080	15

Gray County

Magnolia	2-Wright	I&GN Sec-13 Blk-3	2776-2787	410
McMan	4-Jackson	H&GN Sec-90 Blk B-2	2880-2890	708
McMan	3-Jackson	H&GN Sec-90 Blk-B-2	3015-3024	900

Hutchinson County

Midwest Explor	1-Ware	I&GN Sec-124 Blk-4	3106-3121	225
Midwest Explor	2-Ware	I&GN Sec-124 Blk-4	3103-3108	239

Wheeler County

Texas	1-Cuddeback	H&GN Sec-18 Blk-24	1905-1921	30M
Martin-Debons	1-Close	H&GN Sec-83 Blk-23	1564-1565	35M
Murchison-Fain	5-Close	H&GN Sec-76 Blk-23	T.D. 1285	Dry

WEST TEXAS

Crockett County

Eppenaun et al.	1-Noelke	Mullins Sec-60	T.D. 2561	Dry
California	3-Powell	GC&SF Sec-62 Blk-BB	2611-2623	110

Garza County

Steed	1-Boren	H&GN Sec-136 Blk-5	2505-2546	15

Glasscock County

Sun	3-Phillips	T&P Sec-14 Blk-33	2094-2300	50 (1 Hr.)

Howard County

Godley	2-Hooks	W&NW Sec-140 Blk-29	1858-1859	40
Merrick-Bristow	12-Hooks	W&NW Sec-140 Blk-29	1947-1949	10
Continental	6-Chalk	W&NW Sec-140 Blk-29	1839-1848	63
Shell	1-Kloh et al.	T&P Sec-13 Blk-33	2170-2305	550
Green	3-Clay	W&NW Sec-127 Blk-29	2580-2650	75

Loving County

Lockhart	1-Hazel	H&TC Sec-84 Blk-33	4177-4227	80
Lockhart	3-Hubbard	H&TC Sec-83 Blk-33	4186-4234	289

Pecos County

Shell	C4-Univ.	Univ. Sec-31 Blk-16	1618-1645	265
Landreth Prod.	G2-Univ.	Univ. Sec-31 Blk-16	970-975	1122
Landreth Prod.	C2-Univ.	Univ. Sec-31 Blk-16	1633-1655	1430
Landreth Prod.	B4-Univ.	Univ. Sec-13 Blk-18	1596-1635	2548
Landreth Prod.	2-Univ.	Univ. Sec-13 Blk-18	1672-1694 P.B. 1690	563
Continental	A5-Univ.	Univ. Sec-6 Blk-17	T.D. 972	5
Continental	A4-Univ.	Univ. Sec-6 Blk-17	960-970	85
Plymouth	3-Perry	TC Sec-29 Blk-178	1864-1926 P.B. 1903	10
Gulf Prod.	21-Smith	TC Sec-28 Blk-194	1540-1770	75 (1 Hr.)

Upton County

Dixie	32-Burleson	Nidiver Sec-2	2020-2058	164

Ward County

Alpine	1-Townsite	H&TC Sec-11 Blk-5	2122-2151	30
Atlantic-Delmar	4-Hazlett	H&TC Sec-17 Blk-5	2455-2500	141

Winkler County

Southern Crude.	T90 No. 4 Hutchins	PSL Sec-47 Blk-26	2765-3005	320
Gulf Prod.	B2-Daugherty	PSL Sec-22 Blk-26	2698-2700	15

Completions in North Louisiana and Arkansas, Week Ended November 28, 1929

Louisiana

Bossier Parish

Company	Well	Location	Depth	Yield
Palmer Corp	Caplis, No. 12	25-16-12	1885	1M gas

Caddo Parrish

Ohio Oil Co	Hunter No. 1	17-18-14	2482	SW-Abnd.

Caldwell Parish

La. Oil and Reg. Co.	La. Central O & G Co., No. 1	31-12-3	1558	SW-Abnd.

Union Parish

Lyons Gas. Co.	H. M. Jones, No. 1	11-20-3E	2179	5M gas

Ouachita Parish

Alamagate Co	Cole No. 3	42-10-4E	2112	5M gas

Richland Parish

Ark-La., P. L. Co	Chenault No. 1	2-16-6E	2430	62M gas

Sabine Parish

Mag. Petroleum Co.	E. E. Hall No. 4	33-10-12	3239	50 bbls. oil

Webster Parish

Company	Well	Location	Depth	Yield
Mag. Pet. Co.	Knight No. 1	23-23-9	2692	20 bbls.
Mag. Pet. Co.	Scoggins No. 2	1-22-11	2708	195 bbls. oil 195 SW
Ohio Oil Co	Bodcau No. 45	21-21-10	4713	183¼M gas

Arkansas

Ouachita-Calhoun-District

Sims Oil Co	E. Johnson No. 4	34-15-15	1988	40 bbls. oil
Standard Oil Co	Powell No. 8	34-15-15	2017	90 bbls. oil 40 Per Cent SW

Union County-Eldorado District

Root Refg. Co	Murphy No. 4	9-16-15	2321	SW-Abnd.

Columbia-Emerson

Tolbert and Markle	Copland No. 1	31-19-22	4509	Dry-Abnd.

Union-Lapile.

Ark-Drlg., Co	Norris No. 1	17-18-12	3400	Dry-Abnd

Many Experiments Necessary to Find Proper Chokes for Marshall Wells

By John Power
N. P. N. STAFF WRITER

TULSA

ONLY by experiment has it been possible to determine to what extent the wells in the Wilcox area of Logan county should be choked to effect the desired proration. No formula, founded on potentials, pressures or gas/oil ratios has been found which will predetermine the size choke to use on any particular well to reduce its production any given amount.

In the Marshall pool, where prorating is being done by cutting below the potentials indicated by the normal decline curve, all the wells are flowing naturally. Experimenting with various sized choke nipples in the flow lines has taken some time, and has caused some slight delay in the field's getting down to the figure which the operators have set as the allowed production.

The experimenting, save for a few wells which have just been completed, is about over. S. W. Collins, who is doing the umpiring in the field, is of the opinion that the second period of proration will show the field well inside its allowed production.

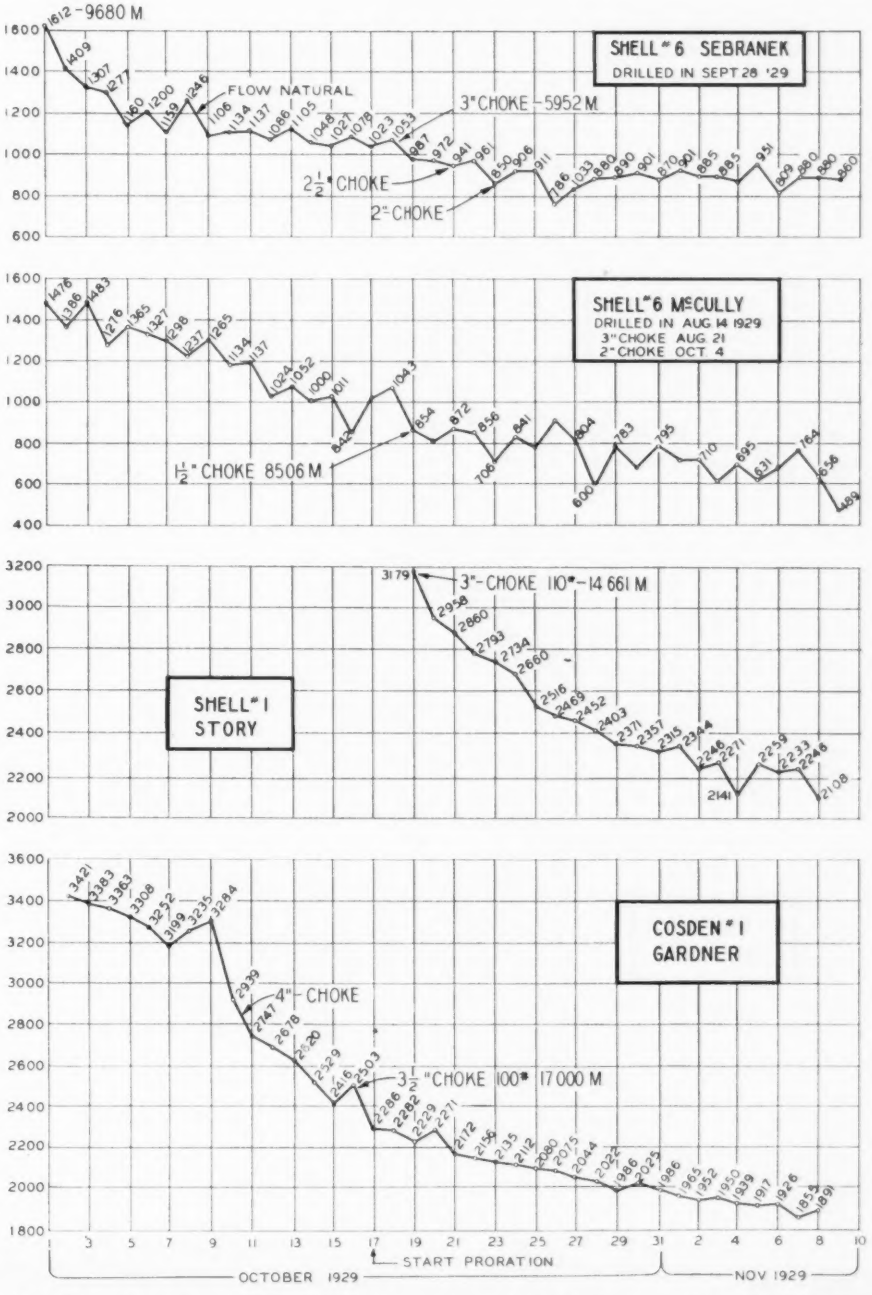
Putting in various sizes of chokes, and checking the results has been the only method which could be followed in cutting the field's production. For example, the Shell Petroleum Corp. No. 9 McCully had three different sized chokes inserted in the flow line before the proper one was found.

The well had a peak production of 2949 barrels on Sept. 26. On Sept. 30 a 3½-inch choke was put in, the well making 2644 barrels. This was before the proration went into effect, but the operating policy throughout the life of the field has been to choke all wells to some extent to conserve the gas pressure on the sand, and to reduce the gas/oil ratio.

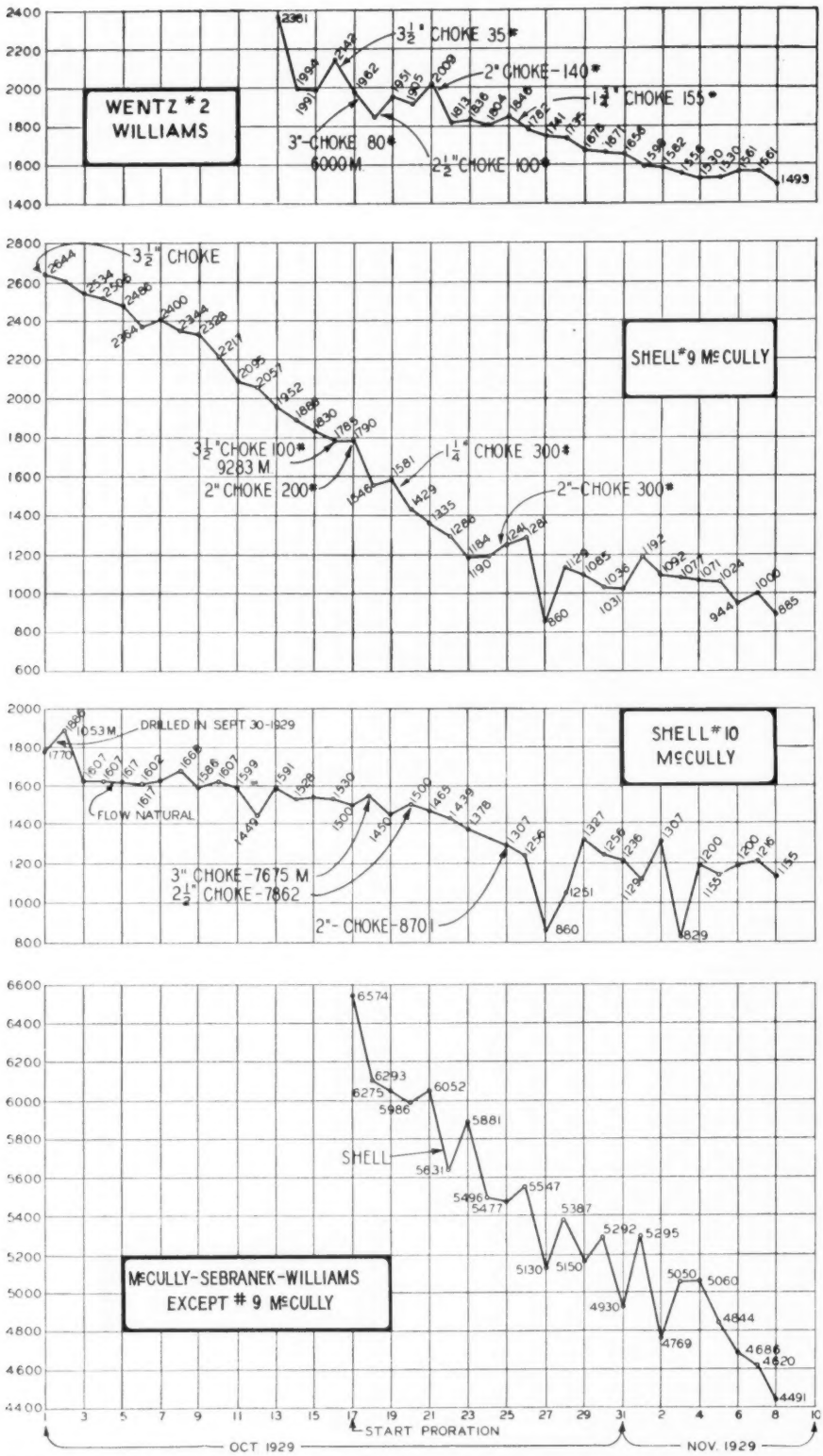
On Oct. 18 a 2-inch choke was applied. The production was cut to 1974 barrels daily, and the back pressure built up to 240 pounds. This amount was still too great, so on Oct. 20 a 1¾-inch choke was used, which cut the production to 1355 barrels. The back pressure increased to 300 pounds.

This was too great a cut, so a 2-inch choke was again tried, but there was no noticeable change in the back pressure, and the natural decline of the well sent the production down to 1068 barrels per day. On Nov. 6, with a 2-inch choke, the well's production was 1000 barrels per day, with a back pressure of 200 pounds.

The No. 10 McCully, NE NW SE of 30-19-4W, also had to be experimented with considerably before a satisfactory choke could be found. Its peak production was that of Oct. 1, when it made 1886 barrels. With but 25 pounds back pressure carried on it the well was allowed to flow naturally until Oct. 17. At that time a 3-inch choke was put in. The production amounted to 1567 barrels, with



Graphic showing of the effect of various sized chokes on the wells in the southern part of the Marshall pool, Logan county, Okla.



Effects on different wells of some of the various sizes of choke nipples. The chart at the bottom is a composite picture of all but one of the wells

the back pressure showing but a slight increase, rising to 30 pounds.

On Oct. 20, a 2½-inch choke was installed, which sent the back pressure up again, reaching 40 pounds. The production showed a decrease, falling to 1465 barrels per day.

This was not enough of a drop, so five days later a 2-inch choke was tried. This boosted the back pressure to 60 pounds and cut the production to 1256 barrels daily. This same 2-inch choke in use until Nov. 6 found the well making 1190 barrels, against 50 pounds back pressure. From the installation of the 2-inch choke the well shows more of a natural decline than a continued decrease due to the size of the choke.

Shell's No. 6 McCully was similar to the No. 5 Sebranek in the northeastern quarter of the section. The former made 1365 barrels against a 3-inch choke. This was on Oct. 2. On Oct. 18, through a 1½-inch choke the well made 854 barrels, against 170 pounds back pressure. Nov. 6, with the same size choke used, the well was making 764 barrels, and the rock pressure had declined to 150 pounds.

One of the newest wells in the field is the Shell's No. 1 Story, for which the gage ending Oct. 18 was the first 24-hour period recorded. Its production at that time was 3179 barrels. The next day a 3-inch choke was put in.

Through the 3-inch choke the well made 2958 barrels, with the back pressure recorded at 110 pounds. Oct. 25 a 2½-inch choke cut the production to 2516 barrels, although the back pressure also showed a decline, going to 100 pounds. Nov. 6, with the same choke in use, the production was 2233 barrels per day.

J. S. Cosden's No. 1 Gardner, a location southeast of the McCully lease, had been producing through a 4-inch choke before proration was applied to the field. On Oct. 16 a 3½-inch choke was installed. The day before the choke was put in the well had made a production of 2503 barrels. The day after it was installed, production amounted to 2286 barrels, against 100 pounds back pressure. On Nov. 6, with the same 3½-inch choke the well was making 1917 barrels, with little change recorded in the back pressure.

A location east of the Cosden well the L. H. Wentz No. 2 Williams was requiring a lot of attention before the proper choke could be found. Oct. 15 the well was making 2142 barrels through a 3½-inch choke, and against 35 pounds pressure.

Oct. 16 a 3-inch choke was put in the line. The back pressure stepped up to 80 pounds, and the production went down to 1962 barrels. The next day a 2½-inch choke cut the production to 1895 barrels and raised the back pressure to 100 pounds.

A still further reduction was determined upon, and Oct. 20 a 2-inch choke was tried. This had comparatively little effect, the well making 1813 barrels, and the back pressure remaining the same. A 1¾-inch choke cut the production to 1741 barrels and raised the back pressure to 155 pounds. Through the same choke the well was making 1530 barrels on Nov. 6. Back pressure had declined to 148 pounds.

WASHINGTON—A branch line into the Turner Valley, Alta., oil field is being considered by the Canadian Pacific Railway.

WASHINGTON—A wet gas well has been brought in in Turner Valley, Alta., by the Associated Oil Co., with an estimated flow of 27,000,000 cubic feet daily.

Expect Oklahoma City "Sand" Wells To Outlast Lime Producers

By Lawrence E. Smith
N. P. N. STAFF WRITER

OKLAHOMA CITY, Nov. 29

HERE in this capital city even the most prideful citizen is beginning to admit what production men have long contended with regard to this oil field—that the production of salt water with the oil is going to increase both in total quantity and in number of wells affected.

Among engineers and executives there is also the belief that the present method of prorating production should be changed. As a means of holding the output to pipe line capacity and as a way of keeping a flood of oil off the market it is ideal.

But in the interests of the greatest final recovery of oil from the field, some of the close students of the field who have watched the steady encroachment of water into wells that produce from the Siliceous lime feel that proration by constant curb on each well rather than the present proration on a time basis would serve better the interests of all who are contributing to the huge financial outlay in developing the field.

The method now in use is the opening of one set of wells for several days—during December 5-day periods will be used—while the other group is shut in. Thus, when the wells are opened, no restriction is placed upon the flow. That this method contributes to the "coning" of water around the wells, which would be partly overcome by back-pressuring, is the thought of several who are engaged in this development.

The pool reached its highest production to date in the 24 hour period ended at 7 a.m. Nov. 21. It then exceeded 90,000 barrels actually produced. By wells, its yield was as shown in the accompanying table.

Additional to this production, the total potential of the shut-in wells, not permitted to produce under the proration agreement, is 100,000 barrels or more.

An accompanying map shows development status of the field and shows wells wherein water has made its appearance. The table of per well production published herewith shows the amounts of water produced by the chief offenders.

No attempt is made in the designations on the map to show the varying amounts of water produced, which ranges from a trace to several thousand barrels.

Not included in the table are three wells which are virtual failures. Shell Petroleum Corp.'s No. 2 Petty, at the south end of the field, produced some oil but is a hole full of water from the Siliceous lime and is plugging back. Indian Territory Illuminating Oil Co.'s and Foster Petroleum Co.'s No. 1 Emerson-Joyce, NE NE of 25-11-2, makes a little oil—60 to 70 barrels—but is rated as a "dud" in the lime at below 6600 feet. The same companies' No. 1 Foster, C NE SW of 24-11-3 is in about the same situation, having a little oil and lots of water with total depth of more than 6700 feet.

Geologically, the field has many peculiarities that only further drilling will clear up. For want of a better explanation for the abrupt plunge on the east side of the field, as revealed in the Hiddleston wells of Prairie & Slick in the SE of 19-11-2, it is assumed that a fault exists. The drop from No. 1 in the southwest corner of this lease to No. 2 in the southeast corner, a half mile, exceeds 500 feet.

It will be remembered from articles heretofore published in these columns that this field as now developed lacks the orthodox geologic section, such formations as the Hunton, Sylvan, Viola and Wilcox being absent. It is believed that they will be found in place on the flanks. On the top of the eroded surface of the Arbuckle (Siliceous) lime is deposited a considerable thickness of "trash" known locally as the detrital zone. Within this zone are sand lenses and a number of wells produce from these "sands."

The conviction is growing that the substantial production of the field—that which will have the greatest length of life—will prove to be this "sand" production. New developments in the south end of the field such as the Sinclair Oil & Gas Co.'s No. 1 School Land, in Sec. 36 and the same company's No. 2 Kinter, both "sand" wells, have made this part of the area look imposing.

As mentioned, the water encroachment is confined to the Siliceous lime

Production by Wells of Oklahoma City Field

Company	Well	Location	Oil	Water
Coline Oil	1-Olds	24-11-3	4,163	0
Coline Oil	2-Olds	24-11-3	4,716	0
Coline Oil	3-Olds	24-11-3	shut in	
Cromwell-Franklin	1-Trosper	13-11-3	3,942	8 %
I. T. I. O.-Foster	1-B. Anderson	30-11-2	5,826	
I. T. I. O.-Foster	2-A. Bodine	24-11-3	2,012	
I. T. I. O.-Foster	1-S. Bodine	30-11-2	1,689	5,180
I. T. I. O.-Foster	2-S. Bodine	30-11-2	80	60
I. T. I. O.-Foster	1-Button	19-11-2	2,862	
I. T. I. O.-Foster	2-Button	19-11-2	shut in	
I. T. I. O.-Foster	1-M. Fuzzell	19-11-2	15,574	
I. T. I. O.-Foster	1-Johnson	25-11-3	2,646	
I. T. I. O.-Foster	1-Henning	24-11-3	1.345	6,600
I. T. I. O.-Foster	1-Fee (discovery)	24-11-3	2,539	4,600
I. T. I. O.-Foster	1-T. Fuzzell	13-11-3	shut in	
I. T. I. O.-Foster	1-Trosper	13-11-3	888	970
Mid-Kansas	1-Browning	18-11-2	shut in	
Mid-Kansas	1-Fortson	24-11-3	1,911	
Mid-Kansas	2-Fortson	24-11-3	1,743	
Mid-Kansas	3-Fortson	24-11-3	shut in	
Mid-Kansas	4-Fortson	24-11-3	shut in	
Prairie-Slick	1-Hiddleston	19-11-2	4,040	
Prairie-Slick	3-Hiddleston	19-11-2	shut in	
Shaffer et al	1-Childs	14-11-3	7,210	
Shell	1-Petty	30-11-2	8,611	
Sinclair	1-Stamper	30-11-2	1,590	4,000
Sinclair	2-Stamper	30-11-2	shut in	
Sinclair	3-Stamper	30-11-2	shut in	
Sinclair-Amerada	1-Kinter	30-11-2	gasoline	
Sinclair-Amerada	2-Kinter	30-11-2	2,825	
Slick	1-Glidden	13-11-3	7,800	10 %
Slick	2-Glidden	13-11-3	1,873	
Wirt Franklin	2-Lowery	13-11-3	5,627	
			91,479	

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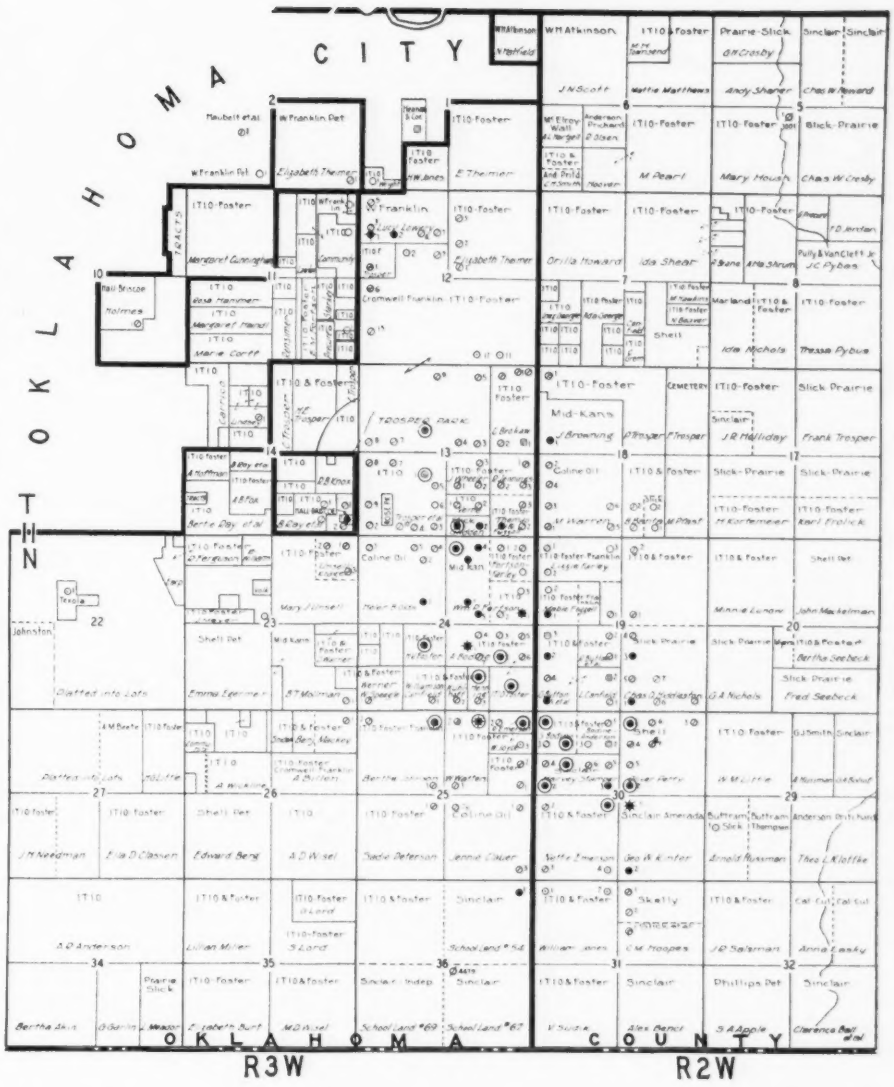
and here is found another resemblance to the Garber field, which also possesses this eroded Arbuckle "high," although the exposure in Oklahoma City is much greater.

Roughly three-fourths of a mile north of the new Sinclair "sand" wells the same company's No. 1 Stamper, a Siliceous lime well which early suffered from water, has been put on air lift. It had declined in oil production as its water increased to 6000 barrels daily and better, and two weeks ago stopped flowing. On the lift it is producing about 1500 barrels of oil daily and some 4000 barrels of water.

Operations in the field at this time, including both drilling and producing wells total 169. They are divided as follows:

I.T.I.O.-Foster Pet.	87
I.T.I.O.-Foster, Wirt Franklin, Cromwell-Franklin	20
I.T.I.O.-Foster, Wirt Franklin	1
Shell Pet. Corp.	7
Wirt Franklin Pet.	9
Coline Oil	15
Slick & Prairie	7
Sinclair O. & G.	7
Sinclair-Amerada	2
Mid-Kansas O. & G.	7
Skelly Oil	1
T. B. Slick	3
Shaffer-Hall & Briscoe	1
Hall & Briscoe	1
Sooner Development	1



The Oklahoma City field, showing present development and wells (circled) which are making or have made water. The amount ranges from a trace to several thousand barrels per day

Gray Takes Issue With Wilbur on "Waste"

WASHINGTON, Nov. 30.—W. H. Gray, president of the National Association of Independent Oil Producers, has taken Secretary of the Interior Wilbur to task for his statement, in an article in the Saturday Evening Post, that the oil industry is making a ruthless waste of a great natural resource.

Mr. Gray wrote a letter to George Horace Lorimer, editor of that magazine, and sent a copy to Senator Thomas, of Oklahoma, who had the letter published in the Congressional Record. It is as follows:

Dear Sir: The National Association of Independent Oil Producers is affiliated with most every independent association in the United States. Among these associations may be catalogued the Mid-Continent Royalty Owners Association, which particularly represents the landowners and the owners of mineral rights in Oklahoma, Texas, Kansas, Louisiana, and Arkansas.

It is the firm belief of these associations that only the States have any power in the matter of the regulation of the petroleum industry and in addition to that we believe the constitutions of these States gurantee to them their title without any interference by the Federal Government. However, we welcome any assistance the Federal Government is able to give us in the matter of conservation of the petroleum resources of this country.

It goes without saying that owners of the land from which oil is being produced are as heartily in accord with the matter of prevention of waste as would be the Federal Government or the States. They want their properties developed, but they do not want any waste and they have shown themselves always willing to cooperate with the operator of the oil properties and with the Government.

The petroleum industry stands willing to comply at all times with any rule in the matter of conservation that is fair and reasonable, but it does request that every other natural resource be brought under the same rule that might be applied to the petroleum resources.

Mr. Wilbur, in his statement in your valuable magazine, charges the oil industry with a ruthless waste of a great natural resource. This statement we deny, and in answer to him we say that there is no industry in the United States today that is cooperating as efficiently as the oil industry in the matter of conserving its resources. There is not an association within the industry that is not doing its part. There is not an industry that employs more engineers and scientific men for the purpose of conserving every operation within the industry, and there is no waste.

On behalf of the independent producers and landowners in the United States we invite an investigation by any governmental body that may be selected to investigate and determine whether or not the petroleum industry is conducting itself in such a manner that it should be subjected to the criticism of high governmental officials.

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National Petroleum News
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Shot in Well Tamped with Cement Plug Gives Good Results

By John Power
N. P. N. STAFF WRITER

TULSA

THAT a shot set off in an oil sand is as effective as the tamping is an axiom with those who believe that the purpose of a shot is to break down the sand, and to permit the freer passage of oil through the sand into the hole. There are of course, those who maintain that this is not the function of a shot, arguing that the sudden vacuum created by the explosion of the shot brings the oil into the hole.

The latter theory has nothing to do with this story, nor with Ross Lefever, superintendent for the Thlocco Oil Co., who believed in tamping sufficiently to do it with a cement plug.

Mr. Lefever had a well on the famous Thocco farm in 9-18N-7E, north of Drumright that he wanted to shoot. And he wanted to shoot it so that all the force of the shot would be directed against the sand, and not up the hole.

One hundred and five quarts of nitro-glycerin were placed in the hole, this amount being all that could be got into the sand body.

To make his tamp Mr. Lefever decided to try to set a cement bridge on top of the shot to hold the force of the explosion within the sand. He took an empty nitro shell about four inches in diameter and punched a lot of holes in it. Through these holes he ran pieces of wire line a little longer than the diameter of the shell, so that the outside of the shell appeared to have a lot of bristles sticking out of it.

This shell was driven down the hole with the bailer until he had it at about the bottom of his pipe. Mr. Lefever then set a couple of burlap sacks on top of the shell, and on top of these he ran in about five feet of loose chat.

Using a dump bailer he then lowered enough wet cement down the hole to fill up about 10 feet. In the cement was mixed a liberal proportion of Konset to accelerate the setting of the cement as much as possible.

He had to have speed in setting, for he had but 23½ hours to locate his bridge and set his cement. He used a Type B Zero Hour Bomb, which gave him the maximum time he could get from this type of detonator. It was obviously impossible for him to use anything else than a bomb to set off his shot as the bridge made it impossible to use a jack squid or electric wires controlled from the top of the hole.

Incidently, Mr. Lefever must have got the maximum time out of his bomb, for it was run in the hole at 11:30 a.m., and went off the next day at 11:02 a.m.

When the shot went off there was a deep subdued rumble, indicating that most of its force was spent against the sand, and not up the hole. Of course the plug was blown out, small pieces of cement sailing well up the derrick.

The results obtained from the shot made an enthusiast of Mr. Lefever for this method of tamping. He considers the results to have been by far the best to be obtained from any shot set off on the lease in the four years that he has been in charge. He feels that the shot was at least three times as effective as similar shots in similar wells, but which were not tamped in this thorough manner.

The well was in the Bartlesville sand. Top of the shot was at 2530, with the bottom of the casing at 2505. With the plug occupying about 20 feet, the top of the plug was about five feet below the bottom of the pipe.

The bomb used was of the type which sets off the charge by the closing of an electrical circuit at a predetermined time. For special shots, where more than the usual amount of time is needed between the setting of the shot and the explosion of the charge, the Zero Hour Type "B" was designed.

It functions in an identical manner to the familiar "A" type, except that the watches employed are so made that the hour hand, which closes the electrical circuit, moves at half the rate that it does in the standard type watch.

The face of the watch is also made especially for this type of bomb. The figures are put in counterclockwise order in order that the setting will indicate the number of hours which will elapse between the setting of the bomb and the time of the explosion. The watch face on this long time bomb is calibrated for 24 instead of 12 hours.

HOUSTON, Nov. 29.—Completion of the Gulf Production Co.'s steel storage construction program at its Lucas tank farm, near Beaumont, will give it total crude oil capacity there of more than 5,200,000 barrels. Present construction work is on 10 steel storage tanks of 80,000 barrels capacity each.

Modern Refining—Science and Practice

By Colonel George A. Burrell*

Article 2

Hydrocarbons in Petroleum; Paraffins in Lubricating Oils; Naphthenic Acids; Studies of Paraffin Wax

CRUDE petroleum is made up, as far as we know, of paraffin, naphthene and aromatic hydrocarbons, and oxygen, sulfur and nitrogen compounds.

Of the paraffin gases, methane predominates in natural gas and of the liquids, butane, pentane and hexane predominate in natural gasoline. Hexane, heptane, octane, nonane, decane and undecane, and corresponding members of the other groups predominate in ordinary motor gasoline, and undecane, dodecane, tridecane and tetradecane and corresponding other hydrocarbons predominate in kerosene. The average boiling point of gasoline corresponds to a mixture of octane and nonane. There is some overlapping with kerosene.

Once Appalachian oil, typified by Pennsylvania oil and called paraffin base oil, was in high favor as the standard of all American petroleums, both as to light distillates and lubricating oil. Now it is known that Pennsylvania gasoline suffers by comparison with some western gasolines, and with cracked gasoline because of its detonating properties. It contains too much of the paraffins.

It was also once thought that Pennsylvania lubricating oil owed its favoritism in trade to paraffin hydrocarbons contained therein. But the wax present in these oils lacks viscosity and further, it is largely removed in the dewaxing process, leaving as far as we know a series of hydrocarbons called the naphthenes or polynaphthenes.

It can be said that virtually all possible members of the paraffins, naphthenes and aromatics (within the boiling range) have been found in the gasoline fraction of various petroleums. Pennsylvania gasolines are the most paraffinic and certain California ones the most aromatic. Some gasolines are decidedly naphthenic. What the compositions is of certain anti-knock straight run gasolines from the middle west and southwest the writer does not know. Presumably they are naphthenic or aromatic, or both, to a high degree. Frank A. Howard, of the Standard Oil Co. of New Jersey, has found gasoline to contain as much as 70 per cent naphthenes.

Kerosenes should partake of the nature of the gasoline fractions, but Wagner's[1] work is highly interesting in that he found no paraffins in a Mid-Continent kerosene which he examined.

No work has been published on the composition of gas oils. H. E. Ferguson, of the Peoples Gas Light & Coke Co., Chicago, sent the writer the graphs shown at Figure 1, which give the amount of gas, for enriching coal and water gas, derived by cracking various kinds of gas oils. He finds that the amount of gas produced is largely dependent upon the amount of hydrogen available to effect the conversion of carbon in a liquid compound to a gaseous form; hence paraffinic oils appear at an advantage. Ferguson says that some work has been attempted to fix a price differential for gas oils, but that production of oil is so varied and so greatly affected by varying demands for petroleum products that no success has been achieved.

Pennsylvania lubricants have long enjoyed favor with the trade and demand the highest price. Their flash and fire tests are higher, their gravities higher, they are less volatile for the same viscosity, they are most resistive to oxidation, and their viscosities change less with temperature than is the case with asphaltic oils.

The term asphaltic oils is used more or less loosely in the trade. Usually it means those oils of high asphalt content like oils of the Gulf Coast and many California oils. However, crude oils contain varying quantities of asphalt from those of Trinidad, British West Indies, and Panuco, Mexico, of high content, through oils containing more or less of the material like Mid-Continent oils and the Pennsylvania crudes which contain almost none.

From a chemical standpoint it appears that they contain more of the lower members of the naphthene series of hydrocarbons up to C_nH_{2n}—8, than do asphaltic oils. No conclusive work has been done showing unsaturates present in lubricating oils, although this is indicated by some investigations.

The fact that some oils are so reactive to sulfuric acid leads to this conclusion. It seems almost certain to the writer, that some day unsaturates will be identified in quantity, in lubricating oils, at least in some of them. Mabery never concurred in this view. Through his long series of investigations he never identified unsaturates in lubricating oils. Others, like Bacon,[1] Seyer[2] and Smith,[3] find them, or strong indications of them. However, separations were made by group solubility methods, which lack conclusiveness.

As far as olefins, say in straight run gasoline, are concerned, the author can reconcile their apparent absence therein, with the fact that

*Consulting Chemical Engineer, Pittsburgh.

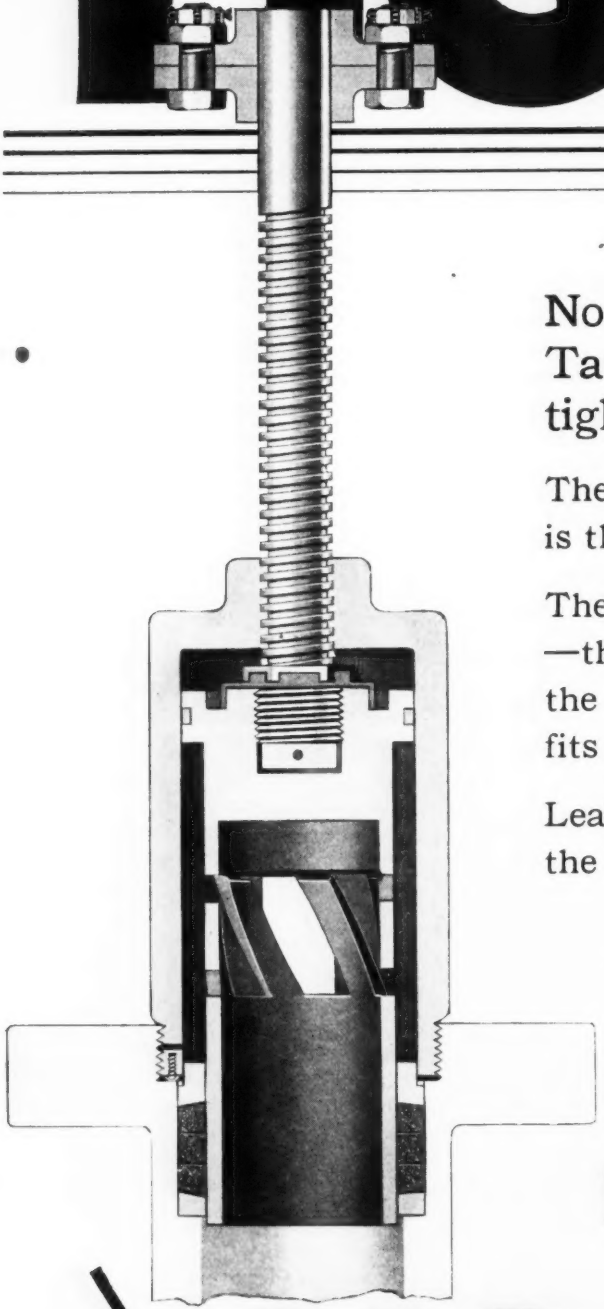
[1]Before Am. Chem. Soc., Milwaukee, Wis., Sept., 1925.

[1]Ind. Eng. Chem., 20, 9, 1928.

[2]Trans. Roy. Soc. Can., May, 1921.

[3]U. S. Bur. of Mines, Serial 2837, Nov., 1927.

TIGHT!



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they are not present in natural gas, as determined by the writer.

Nitrogen in Petroleum

Bailey's[1] work on nitrogen is the most authentic. Along with Poth, Armstrong and Cogburn, he found that frequently there occurs approximate uniformity in the amount of nitrogen in crude oil over a wide area, the nitrogen content of oil from pools of a common origin apparently agreeing more closely than the sulfur content.

They found less nitrogen than was indicated by Mabery's work and have stated that the latter gave high results. No more than 0.81 per cent nitrogen was found in any one of the 37 California samples examined. Gulf crude oils gave less than 0.10 per cent.

Pyridine and quinoline bases and their hydrites have been identified in petroleum from various sources. Bailey isolated the compounds $C_{12}H_{17}N$ and $C_{11}H_{21}N$ from residues from the refining of California oils with sulfur dioxide. Mabery and Hudson[2] isolated compounds from $C_{12}H_{17}N$ to $C_{17}H_{31}N$. That petroleum may some day be a rich source of commercial nitrogen compounds is believed by some.

Composition of the Heavy Fractions of Petroleum

Little is known about the composition of the heavy fractions of petroleum; the asphaltic portion, and the so-called asphaltenes and resins.

They can be produced by oxidation, polymerization and condensation reactions. Asphaltenes is the name given that portion which dissolves in carbon disulfide, benzene and carbon tetrachloride, but not in light naphtha. Asphalts are soluble in the latter.

This is Holde's classification. So-called resins to the extent of 4 per cent were isolated by Holde and Eickman[3] from Russian lubricating oil. Sachanov[4] divides the solid constituents of petroleum into paraffins, asphaltenes, neutral resins, asphaltogen acids and asphaltogen acid anhydrides.

The paraffins are crystalline substances, whose melting points vary between 40 and 70 degrees C. (104-158 degrees F.) The asphaltenes are black amorphous substances, brittle, infusible and decomposed by heat. The neutral resins are red, elastic, solid at ordinary temperatures and softened by heat. The asphaltogen acids and their anhydrides have been studied but little and form an insignificant part of petroleum.

Naphthenic Acids

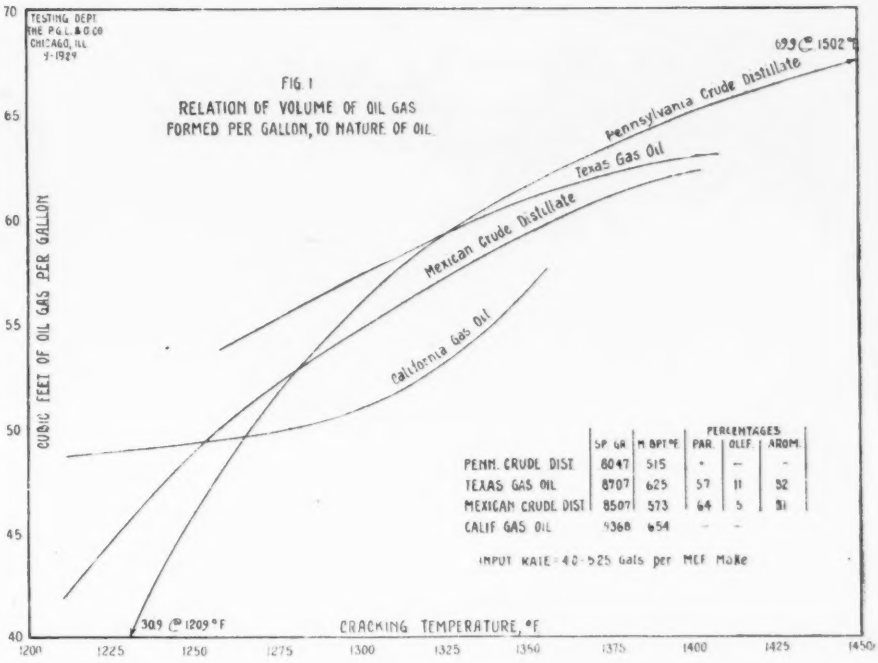
Naphthenic acids are the most important petroleum acids. They were first discovered by Eichler and given the general formula of the fatty acids, $C_nH_{2n}O_2$. Later they were called naphthenic acids by Markownikow. They are primarily found in crude petroleum and also extracted from the wash liquor produced by neutralizing distillates with alkali. They are probably never present in quantity greater than 1 per cent of the oil.

They are probably acids of the so-called naphthene hydrocarbons and as such should have the formula C_nH_{2n}—1, COOH, i.e., they are the carboxylic acids of the naphthenes. Their isolation is made difficult by the presence of a large number of isomers. The acids begin to boil at about 130 degrees C. and continue up to 360 degrees C.

These naphthenic acids form salts with bases, caustic soda and potash, and these salts are soluble in water and have the consistency of soft soap and possess a strong detergent action and are said to be used as soap in Russia. In this country they are incorporated in greases to some extent.

Phenols

Another form in which oxygen exists in petroleum is as phenols. Substances like phenols have been isolated by Mabery,[1] Brooks[2] and Zaloziecki and Freund.[3] Tanaka and Kobayashi[4] recently investigated the phenolic compounds in the kerosene fraction of Japanese petroleums. They were extracted from the crude naphthenic acids. The boiling points of the main fractions closely resembled those of cresols, xylenols and ethylphenols. Story and Snow[5] found indications of phenols being produced by cracking.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5-1929
FIG. 1
RELATION OF VOLUME OF OIL GAS
FORMED PER GALLON, TO NATURE OF OIL
Pennsylvania Crude Distillate
Texas Gas Oil
Mexican Crude Distillate
California Gas Oil
CUBIC FEET OF OIL GAS PER GALLON
CRACKING TEMPERATURE, °F
309 @ 1209 °F
699 @ 1502 °F
SP GR | M BPT °F | PERCENTAGES PAR. | OLEF. | AROM.
PENN. CRUDE DIST | 8047 | 515 | * | -- | -
TEXAS GAS OIL | 8707 | 625 | 57 | 11 | 32
MEXICAN CRUDE DIST | 8507 | 573 | 64 | 5 | 31
CALIF GAS OIL | 9368 | 654 | -- | -
INPUT RATE = 4.0 - 5.25 Gals. per MCF Make

Paraffin Wax

A long list of investigators have studied paraffin wax. It is generally believed to be composed of paraffin hydrocarbons of molecular formula $C_{21}H_{44}$ to $C_{28}H_{72}$, although the first of the solid paraffins has the formula $C_{18}H_{38}$. These solids of low molecular weight remain dissolved in the oil, i.e. in the pressed distillate of the wax plant. However, Henderson, Ferris and Cowles[1] concluded that there are a number of types of solid constituents in paraffin wax which show a wide graduation of properties, particularly melting point, and that these may be various isomers, unsaturated compounds, or even cyclic compounds.

Much work has been done on the type of crystals formed. So-called needle crystals predominate in refinery wax, but plate crystals may also persist. The latter are said by Buchler and Graves[2] and by Rhodes, Sutton and Mason,[3] to be the normal form for pure paraffins, the needle form being produced by a soft wax impurity which they isolated but could not identify.

Good sweating wax crystallizes as a uniform crystal type. The shape of the crystals has an important bearing on the ease with which oil drains away. In needle form the crystals do not compact so much, thus leaving interstices from which the oil can flow upon pressing it. Carpenter[4] obtained good results by cool-

[1]Bull. Am. Pet. Inst., Sept., 1927.
[2]Pro. Amer. Jour. Sci., 31, 20, 1894.
[3]Pet. 2, 1077, 1907.
[4]Chim. et ind., Jan., 1927, p. 65.

[1]Pro. Am. Acad. Sci., 36, 255, 1901.
[2]Ind. Eng. Chem. 16, 587, 1924.
[3]Chem. Ztg., 24, 553, 1900.
[4]J. Coll. Eng., Tokyo, 17, 127, 1927.
[5]Ind. Eng. Chem., 201, 359, 1928.

[1]Before Am. Chem. Soc., Columbus, Ohio, May, 1929.
[2]Before Pet. Div., Am. Chem. Soc., Richmond, Va., April, 1927.
[3]Ind. Eng. Chem., 19, 935, 1927.
[4]Jour. Inst. Pet. Tech., 12, 288, 1926.

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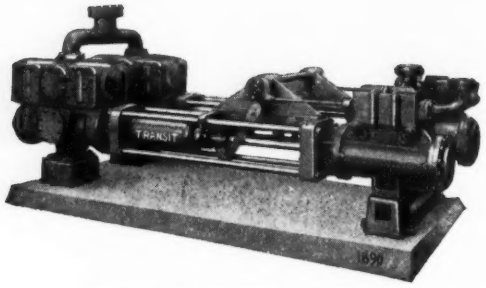

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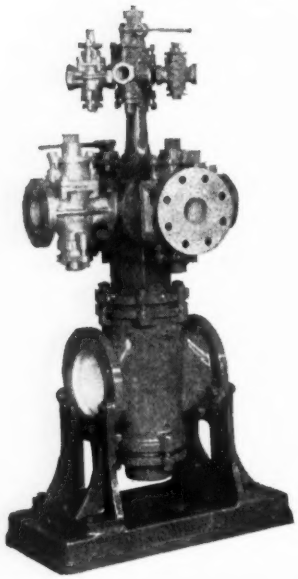

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ing oil-wax solutions in stages. He also tried cooling from high temperatures and found by thus rendering the oil less viscous at the start opportunity was afforded for better crystals to form than at lower temperatures and hence from more viscous solutions.

Kaufman[2] noted that slow cooling of slack wax before sweating is advantageous in giving a high yield of slack wax, and that a higher yield of scale wax is also obtained when the melted wax is slowly cooled until it is solid, or very nearly so, then agitated prior to final solidification and before starting the sweating operation.

Carpenter noted a substance he called mineral jelly that dissolved wax forming a solution which prevents good crystallization. Gurwitsch, in his 1912 edition of his book, says that all wax is crystalline but the degree of crystalline development is limited by the viscosity of the oil and other constituents and possibly by the presence of some unknown collodial material.

This substance indicated by Gurwitsch and Carpenter was later investigated by Buchler and Graves.[3] They found it to hinder crystallization of wax but could not identify the material. A certain amount is necessary to needle formation of crystals, thus changing the crystal from the normal plate form, but an excessive amount leads to an amorphous or micro-crystalline appearance, and wax distillate has to be recracked to get rid of it.

Jones and Blachly[3] confirmed the presence of this soft wax impurity and noted that it could be isolated in a very small fraction of the petroleum. They also noted a connection between it and coloring matter of oil in that any reduction in color resulted in a reduced softness of the wax.

However, refiners have, for a considerable time, been concentrating this soft wax and much of the coloring matter of oils in the base of a good fractionating tower. Hence wax distillate streams can be taken overhead, or as side streams, and directly pressed, and filtering costs are greatly reduced. If oil is distilled under a vacuum so that boiling points are reduced, temperatures are kept down and this too results in less coloring matter being present in oils, due to an absence of cracking. Cracking an oil produces coloring matter in same.

Of new methods of wax removal might be mentioned its solubility in a mixture of acetone and benzol as practiced by one company. These substances have long been known to

[1]Refiner, 8, 75, 1929.
[2]Before Pet. Div., Am. Chem. Soc., Richmond, Va., April, 1927.
[3]Before Am. Chem. Soc., Swampscott, Mass., Sept., 1928.

dissolve wax from oil at low temperatures. In the use of acetone Rue and Beal[4] found that 10 parts of acetone were necessary to 1 part of non-viscous lubricating distillate, and 12 parts for viscous distillate in dewaxing Salt Creek (Wyoming) distillate. The crude oil distillate contained 41 per cent of wax.

Smith[1] used secondary butyl alcohol and acetone. Wilson and Wilkins[2] used ethylene dichloride. Holde[3] used a mixture of ethyl alcohol and ether, and so on. What the economy of these processes is on a large scale the writer does not know. Wax can be adequately removed, but solvent losses are large.

Wyant,[5] in 1924, made the first extended study of wax sweaters. His work did much to bring about more uniform temperatures in sweaters, and improved practice. He found that where one refiner took 110 hours to raise the sweating over 24 degrees F., another took 6 hours, and that efficiencies of sweating plans varied from 23 to 85 per cent.

Wax removal from petroleum has followed an interesting development through the years. At first distillate was chilled in cloth sacks and the wax pressed therefrom. Cold settling tanks were exposed to the weather with the result that a rise in temperature entirely destroyed the chilling effected by previous cold weather.

The modern wax press up to recent years could only work on a rerun (cracked) distillate. The centrifuge was introduced in 1916 to throw amorphous wax out of solution by centrifugal force, and now so-called filter aids (diatomaceous earth) is mixed with wax solution (in naphtha) chilled and the oil pressed out of the mixture by a filter press, the wax being later reclaimed from the naphtha and earth.

Solvents are used (benzol and acetone) in at least one plant to separate wax. A small fraction, called soft wax, was found to inhibit wax separation and require cracking of distillate to change it, hence it is isolated in a column, so that a directly pressable distillate can be taken from a column without rerunning it to crack it. Coloring matter concentrates itself along with this fraction so that filtering of distillates is greatly reduced.

[1]U. S. Bureau of Mines, Serial No. 2822.

[2]Ind. Eng. Chem. 16, 19, 1924.

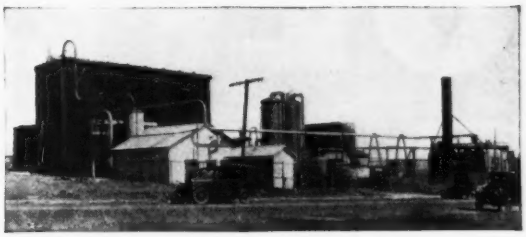
[3]Hydrocarbon Oils and Saponifiable Fats and Waxes. 2nd Edition, p. 2491, 1922.

[4]T. P. 449, U. S. Bureau of Mines, 1929, p. 118.

[5]Before Nat. Pet. Ass., Sept., 1924.

CLEVELAND, Dec. 2.—L. B. Martin, formerly manager of the State Oil Co. of Lincoln, Neb., has joined the staff of the Refiners Oil Co., Dayton, Ohio. The State company was taken over by Phillips Petroleum Co.

Billions of Bubbles



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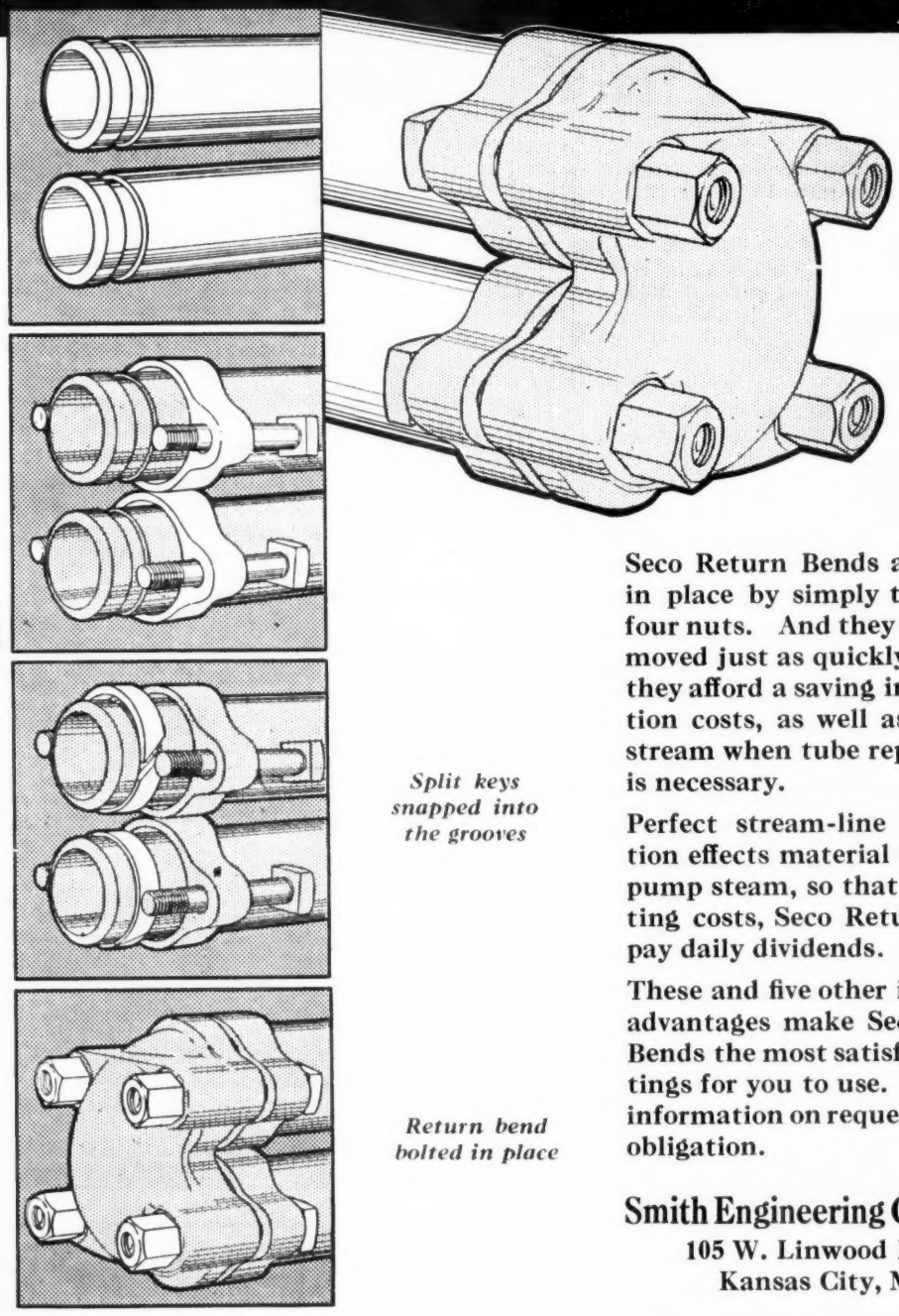

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Retail Price of Mid-Continent Motor Oils Forced Up by Higher Costs

By Allen S. James
N. P. N. STAFF WRITER

Staff Special
TULSA, Nov. 28

THE majority of trade-marked motor oils made from Mid-Continent crudes and marketed by Mid-Continent refiners through their own retail outlets or those of their jobbers accounts have moved out of the 25 cents-a-quart price basis to 30 cents or even higher. Some of these oils have been selling at the new prices for more than eight months. Others were advanced only within the past three or four months.

Indications are that, by the first of the year, virtually every Mid-Continent refiner will be marketing his oils at the higher price levels.

Mid-Continent refiners making their own neutral oils and bright stocks used in compounding their trade-marked motor oils have set the pace in obtaining higher prices. They have been closely followed, however, by the Mid-Continent refiners who do not have their own lubricating plants but who buy their trade-marked oils already compounded for distribution through their own gasoline retail outlets, or who buy the materials and do their own compounding.

The scarcity of bright stocks and the resultant higher prices which have prevailed have caused the general advance in motor oil prices. Bright stocks have advanced almost 10 cents a gallon within the past 10 months. At the same time the percentage of bright stocks required for motor oils suitable to the present type of high compression automobile engine has moved from 10 to 15 per cent up to 35 to 50 per cent.

This advance in cost has been larger than either the refiner or the jobber could absorb if the quality of the oil was to be retained. It was almost inevitable that the price of the finshed product to the public would move upward.

The increase in percentage of bright stock required has been due to the higher operating temperatures of the high compression motors. An oil was needed which would give a maximum of lubrication with a minimum loss from volitalization at the higher temperatures. About the only way to obtain this grade of oil was to use more bright stock.*

A careful check was made recently among Mid-Continent refiners relative to their motor oil prices, and their plans for the future. Two of the largest Independent refining and marketing companies in the Middle West already have advanced their prices to a minimum of 30 cents a quart. One of these companies obtains 40 cents a quart for its aviation grade of oil made from Mid-Continent crude. This company also sell a Pennsylvania grade of oil at 35 and 40 cents a quart. The other company makes most of its motor oils from Mid-Continent crude although the refinery is located in a district outside the Mid-Continent.

Another large company at the present time is getting 25 cents a quart for its motor oil, but has announced through its house organ that it will manufacture a new type of oil, which, according to reports, will sell for more. The company is in the midst of a program of expansion which will almost double its lubricating oil output. It has not been annuonced, however, whether or not the company also will manufacture a grade of oil to sell at 25 cents a quart.

One of the largest manufacturers of lubricating oils within the Mid-Continent has been selling its best grade of motor oil for some months at 30 a quart. The company still makes a 25-cent a quart oil but has not been pushing this grade to any great extent.

Three or four companies continue to sell their light, medium and heavy oils at 25 cents a quart but have been obtaining 30 cents a quart for their extra heavy oils. Indications are they will advance their prices on the other grades by the first of the year unless there is some hitch in their present plans.

ONE company has found that the demand for its light grade of motor oil has fallen so greatly this year that it will discontinue the manufacture of this grade, and it was reported the company at present is contemplating the installation of equipment to make a lower cold test oil with greater heat resisting qualities, which will undoubtedly be marketed at a higher price.

The summary of this check among refiners revealed that three companies are now selling at 25 cents a quart, but one of them will advance prices as soon as its new oil is placed on the market. Four companies are selling at 25 and 30 cents, with indications they will advance prices. One of these companies is selling the same grade of oil at the two prices, primarily as an experiment, and reports from division managers indicate the oil moves as well at 30 cents, as at 25 cents. The other nine companies get 30 cents or more per quart for their oils.

Considerable data relative to the bright stock market also was obtained during the check. It will be recalled that prices started advancing rapidly late in the fall of 1927. The market in past years has been at its low ebb during the winter, and normally that was the time when contracts for the next year were made.

SEVERAL refiners made contracts late in 1927 and early in 1928 and failed to estimate the tremendous effect the new Ford and the higher compression motors actually would have on the bright stock market. Some of these contracts carried maximums of 31 cents a gallon for 150 viscosity 210 degrees F. bright stock. Some of the sales were for export shipment over a period of time, at a flat price.

Several Mid-Continent refiners before the year had advanced very far realized they had made some bad contracts from their standpoint. The demand for bright stock was so heavy that prices on the open market moved well above 30 cents a gallon early in the year, and at present the 150 viscosity stock is selling at 36 to 38 cents a gallon.

One large refiner accepted an export order at a flat price. He had considerable bright stock on hand and accordingly shipped a good bit of the order at once. He realizes now that, if he had filled the order in smaller quantities and over a longer shipping period, he would have had more goods to sell on the open market and accordingly would have realized a better profit. At one time he found himself actually short for his own motor oil compounding requirements.

With that experience in mind several Mid-Continent refiners have been extremely reluctant to make contracts for 1930. The company referred to above has stepped up bright stock

*NATIONAL PETROLEUM NEWS, January 23, 1929, Page 67.

production somewhat but will not have any contracts for next year, according to present plans. The company has been adding to its retail outlets considerably this year and is anticipating a substantial increase in its motor oil business for next year. The surplus bright stock will be sold on the open market.

Another company has already approximately 50 per cent of its bright stock production for 1930 either under contract or will use it for its own motor oils. This company's new contracts are based on the market as shown in NATIONAL PETROLEUM NEWS, with a minimum of 37 cents and a maximum of 41 cents. The sales manager reports the company has had an opportunity to contract every bit of the bright stock which will be made in 1930.

The sales manager for another company reported that he would have very little to sell on the spot market because of the increased amount used in the company's motor oils. Other companies made about the same reports.

Compounders who had their materials bought on contract this year had little to worry about as far as advances in motor oil prices were concerned. Most of the contracts were either on a flat price, or had a maximum price clause. Unless the situation is changed materially before the first of the year, however, some of them undoubtedly are going to have to advance the prices of their finished products because of the higher prices which they will have to pay for the materials. Some of them may even have difficulty in obtaining sufficient materials for their own requirements.

THE percentage of bright stock used per gallon of motor oil meanwhile continues to increase slowly. The higher compression motors operate at higher crankcase temperatures, while the temperatures of the cylinder walls and pistons near the completion of the upstroke are considerably higher. These higher temperatures tend to volatilize lighter oils more rapidly than was the case in the former types of motors. The search at the present time has been for a heat resisting oil which at the same time would give proper lubrication.

The more bright stock the greater the heat resisting qualities of the oil, has been the theory on which the compounders have worked most of this year. Refiners and compounders have made their light oils actually heavier in body, and have added more bright stock to their medium and heavy oils until the point has been reached where, in many instances, the present medium oil is as heavy as the former heavy and extra heavy oils.

Several refinery operating executives have said their idea was that an ideal motor oil at present need not be necessarily heavy but must have heat resisting qualities. They point out that the new type of motor has less clearance between piston and cylinder wall, which tends to retard the flow of a heavy oil—but the public at present demands a heavier oil and they must supply what the public wants, just so long as they know the oil will give satisfactory lubrication.

Meanwhile they apparently are working on the plan of making an oil which will be light enough to flow freely—preferably a zero cold test oil—and one which will resist high temperatures. Just what developments will be made along this line remains to be seen.

Higher Motor Oil Prices Bring No Kicks

CLEVELAND, Nov. 28

HIGHER manufacturing costs of motor oils due to greater bright stock content have raised the general retail price of Pennsylvania motor oils to 35 cents per quart. In remote sections of the country where high freight rates prevail the prices have been advanced to 37.5 cents and 40 cents per quart. This is true on the Pacific coast and in the Rocky Mountains.

One of the most powerful factors in forcing higher retail prices for lubricating oils has been the new Ford. The Model T Ford used a very light oil. Most refiners and compounders used no bright stock in their Ford oil. Much of it was a straight 200 viscosity at 100 F. neutral oil.

Most oil for the new Ford contains about 50 per cent bright stock. As the old Model T Fords disappear from the road and find their weary way to the junk pile they are being replaced either by the growing fleet of Model A Fords or by some other car which also requires an oil of considerable bright stock content.

Ford, of course, is not entirely to blame for the necessity of adding more expensive blending stocks to finished motor oils. The speed at which all other cars operate now-a-days requires an oil which will stand up under terrific punishment. The movement to increase the retail price of Pennsylvania oils started more than a year ago.

Many of the Pennsylvania oils now are nationally distributed and nationally advertised in such publications in the Saturday Evening Post. The new prices on these oils were prominently featured in the national advertising.

In addition the refiners generally had small folders printed for distribution to the motorist so that the 35 cent idea would get over quickly. For example, the Kendall Refining Co., of Bradford, issued a little four page folder with 35 cents per quart featured very prominently and below it the statement, "And the best buy you can make."

Inside the folder the company discussed the "Higher cost of the lower price," seeking to show that it is more economical to buy Kendall oil at 35 cents than to pay 25 cents for an ordinary oil.

The merchandising manager of one company reported that he sent a letter to every dealer explaining the increase in addition to the advertising material published nationally. This company used part of the price increase to give its dealers a better margin on the oil.

In the letter to the dealers the company explained in detail why costs had gone up. In addition it pointed out that it wanted to make it desirable for the dealer to push a Pennsylvania oil rather than to keep the margin of profit so narrow that dealers would prefer to push another oil in order to make a better profit. If the margin was kept too narrow the company felt that dealers would sell the Pennsylvania product only on demand of the motorist by name.

Price increases brought remarkably few complaints either from dealers or consumers, most refiners reported. If there was any decrease in demand as a result it was not noticed. As a matter of fact the most general comment of refiners and distributors was that the average motorist was more convinced than ever that he was buying a quality product when he paid 35 cents instead of 30 cents per quart.

One of the last Pennsylvania refiners to raise its price to 35 cents made the change Oct. 1. This company sells its oil through its own stations to a great extent. Most of the price changes took place about the middle of the year or before.

Within the past few weeks the Indian Refining Co. announced a 35 cent price on its Govers process motor oils. This is one of the first instances in which a company not selling Pennsylvania oil has moved its general price up to the 35 cent level. Special grades of some western oils have sold at 35 and 40 cents, particularly the aviation oils.

Installs Vapor Recovery Plant

CLEVELAND, Nov. 29.—W. H. Daugherty & Sons Refining Co. is installing a vapor recovery plant at its refinery at Petrolia, Pa. Construction work is being done under the direction of the Burrell-Mase Engineering Co. of Pittsburgh.

You can sometimes fool the automobile driver but never the automobile engine

Whatever pleases the engine pleases the motorist too, for it makes driving pleasanter It brings the motorist back for more It builds gallonage

Dubbs cracked gasoline tickles the engine When the engine says a gasoline is good, it *is* good —there's no mistake about it

And it is especially good for the refiner's sales—and his profits

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

VAPOR PHASE REFINING

WILL

Increase your gasoline yields,
Improve your gasoline quality,
and
Reduce your refining costs.

THE GRAY PROCESSES CORPORATION
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NEWARK, NEW JERSEY

Give Lube Oils a Final Clarification

—it's good business insurance

LUBE oil refineries will find that it pays to give their lubrication oil a final clarification before loading for shipment to customers.

The cost of so doing is small and is fully justified as an assurance for selling clean products.

Sweetland Filters with special filter medium are the units used to take out any foreign matter that may be entrained.

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Foreign Opportunities

Reserved information may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, and its district and cooperative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated.

41804.—**Petroleum jelly and crude and refined mineral oils,** Prestoria, South Africa, purchase and agency.

42073.—**Paraffin for match industry,** Tallinn, Estonia, agency.

42153.—**Paraffin,** Copenhagen, Denmark, purchase.

42160.—**Yellow and white petrolatum for ointments,** Hirschberg, Germany, purchase.

42161.—**Petrolatum and mineral oil,** Hamburg, Germany, purchase.

41175.—**Paraffin wax, white,** Canton, China, purchase.

41178.—**Cylinder and lubricating oils.** Pardubice, Czechoslovakia, agency.

41207.—**Lubricating oils and greases,** Addis Ababa, Ethiopia, agency and purchase.

41153.—**Lubricating oils and greases, road oils,** Milan, Italy, agency.

41174.—**Cheap grade gasoline,** Saltillo, Mexico, purchase.

41176.—**White paraffin wax,** Canton, China, purchase.

41489.—**Petroleum, petrolatum and petroleum jelly,** Oporto, Portugal, agency.

41510.—**Fuel oil,** Lisbon, Portugal, purchase.

41511.—**Gasoline, kerosene, and other petroleum products,** Llanelly, Wales, purchase or agency.

42194.—**Lubricating greases,** San Juan, Porto Rico, agency.

42198.—**Oil** (unspecified) Bratislava, Czechoslovakia, purchase.

42199.—**Paraffin,** Pragua, Czechoslovakia, purchase and agency.

42202.—**Lubricating oils,** Buenos Aires, Argentina, agency.

42205.—**Lubricating oils and greases,** Copenhagen, Denmark, agency.

42269.—**Gasoline, kerosene, and lubricating oils,** San Juan, Porto Rico, agency.

42273.—**Oils and waxes,** Berlin, Germany, agency.

42274.—**Paraffin,** Hamburg, Germany, agency.

42290.—**Lubricating oils and greases,** Santa Fe, Argentina, purchase and agency.

42349.—**Lubricating oils and greases,** Bombay, India, agency.

CLARION, Pa., Nov. 28.—The Lubricating Formula Laboratories of Forrest A. Hoff have been moved from Clarington to Clarion. The mail address is P.O. Box 215. Mr. Hoff had added a new department to his business, a purchasing department for oils, fats, chemicals, and compounding and grease making equipment. He will continue to furnish formulas for compounding oils, greases, soaps, roof paints, penetrating oils, bases, and so on.

In the accompanying team photograph from left to right are: top row—J. A. Crenshaw, president of the team; L. F. Harper, S. B. Wisrock, S. S. Harris, C. F. Farmer, R. F. Seely, P. Pettit, and R. E. Meinert, vice president. Bottom row—P. Reid, P. Burlison, "Pop" Jackson, manager of the team; Adair, Campbell, Milazzo, Jones, Nugent, and the mascot

Oil Company Has Champion Baseball Team

EL DORADO, Ark., Nov. 29

THE Cotton States League pennant for baseball championship of class D was won this year by the Lion Oil Refining Co.'s team. That company claims to be the first Independent oil company to own and operate a professional baseball team. It was organized this year and is known as the Lion Oil-El Dorado Baseball Club. It is managed by "Pop" Jackson, claimed to be among the oldest players in the sport. He is past 50, 26 years of which have been spent playing with Boston, Buffalo and with nearly every member of the Texas baseball league.

All players of the Lion team are "pros," receiving salaries during baseball season. During off-season, some of them work in the Lion refinery at El Dorado.

The games played in El Dorado are played at the High School Athletic Association field, which has a grandstand costing $9000. The company pays the association 10 per cent of gross gate receipts for the use of the field, paying over $3000 for this purpose in the past season.

Besides being the champion of its class, the Lion Oil club claims to have had the largest attendance of any class D team in the country, as well as the largest opening day attendance ever known in this class. Paid admissions totaled 4464, while about 1000 others attended. The team was awarded the president's cup for championship.

PITTSBURGH—R. E. Zuker, insulating engineer of East Liberty, Pa., and president of the "Save All" Insulation Co. here, has returned from an extended trip in which he visited refineries east of the Mississippi River.

The company recently completed the insulation and covering of three cold settlers for the Neville Island Petroleum Co., Pittsburgh, and similar equipment for the Conewango Refining Co., Franklin Creek Refining Co., W. H. Daugherty & Son, and for Bruin Oil Refining Co.

Pennsylvania Refiner Visits West Coast

CLEVELAND, Nov. 29.—H. S. Hayden, general sales manager of the Pennsylvania Oil Products Refining Co., Warren, Pa., has just returned from an extensive business trip in the west. He visited in northwestern states and on the Pacific coast.

Business conditions in that general area are very favorable, Mr. Hayden reports. Demand for 100 per cent Pennsylvania oils is growing there. Dealers handling Eldred oils on the west have renewed their contracts for next year and are looking forward to increased sales.

CLEVELAND—The 1929 report of Committee D-2 with all of the American Society of Testing Materials standards and tentative standards has been issued in a pamphlet of 275 pages. The pamphlet is $1.25 for single copies with a special price when ordered in quantities. Copies may be obtained from the A.S.T.M., 1315 Spruce St., Philadelphia.

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Cracking

The development and practice of cracking processes have been followed consistently in National Petroleum News since pressure distillation first became a factor in the refining industry.

Here are 40 cracking stories that have been published the past 12 months:

1929

Modern refining—science and practice Nov. 20, p. 69
10 methods of modernizing old shell stills Oct. 30, p. 83
Cracking progress in past year Oct. 30, p. 153
Increased cracking coil capacity by heat exchangers Oct. 30, p. 162
Fixed gas from Gyro process yields highly anti-knock fuel Oct. 30, p. 173
Automatic control method for cracking still stabilizers Oct. 30, p. 179
Hydrogenation to be used first in conversion of fuel oil July 10, p. 27
Extra soaker on tube-tank battery makes 2000-hour runs June 26, p. 78
Cracking, lube making from Ranger crude June 26, p. 80; June 19, p. 78; June 5, p. 73
Light cracking, de-salting, distilling West Texas crude May 29, p. 65
England to have vapor phase plant to crack coal tar oil May 29, p. 68
Heavy cracked residuum produces specification fuel oil May 15, p. 81
Control gasoline and fuel quality in cokeless cracking process May 1, p. 69
One cracking unit is now whole refinery May 1, p. 76
Patent club offers to license cracking plants perpetually Apr. 24, p. 37
Operation of Gyro process described Apr. 24, p. 40-a
Cracking plants now designed for individual plant needs Apr. 24, p. 83
Cracking still coke, acid sludge, make fuel briquets Apr. 10, p. 68
Cracking costs handed knockout in continuous 60-day run Apr. 3, p. 73
Gyro to license vapor phase process March 13, p. 37
Siamese skimming, cracking plant gets 60% gasoline March 13, p. 69
Improving fractionation in cracking systems March 13, p. 78
Washing heavy cracked naphtha with soap gives color Feb. 20, p. 61
Refinery gets 70% light oil yield Jan. 9, p. 72
How to make benzol from natural gas Jan. 9, p. 79
Tailors refinery to fit the market Jan. 2, p. 26

1928

Factors affecting safe limit for gum in gasoline Dec. 19, p. 75
Sulfur in gasoline Dec. 12, p. 31
Coating to protect cracking units from corrosion Dec. 12, p. 86
Developments in refinery technology Dec. 5, p. 79
Formation of acetic acid in heat and pressure cracking Dec. 5, p. 113
Cracking will have to make fuel for 75,000,000 cars Nov. 21, p. 88
Makes gasoline at low cost Nov. 7, p. 61
Injecting heated gas to vaporize oil Nov. 14, p. 35
Hot oil recirculating unit makes finished gasoline Oct. 17, p. 82
High pressures, corrosive crudes and heat exchange problems Oct. 17, p. 88
Percolating filter plans analyzed Oct. 17, p. 94
Economies in modern gasoline plant Oct. 17, p. 125

Back copies of any of the above issues are 25c a copy. On issues that are exhausted, photostats will be furnished at 40c per page. Libraries in the larger cities generally keep back files of National Petroleum News complete.

National Petroleum News
Main Office: 1213 West Third St.
Cleveland, Ohio

New Equipment

CLEVELAND

A METER and reeled hose outlet for delivery of fuel oil from truck tanks has been developed by S. F. Bowser & Co., Fort Wayne, Ind.

The outfit is designed to expedite deliveries of fuel oil, particularly to homes which take less than compartment dumps at one time.

In test deliveries of furnace oils 996 gallons were unloaded in seven stops in 86½ minutes through the company's displacement meter. The deliveries were as follows, according to the company's announcement:

150 gallons, 12 minutes.
175 gallons, 15 minutes.
200 gallons, 17 minutes.
100 gallons, 11 minutes.
150 gallons, 6½ minutes.
100 gallons, 11 minutes.
121 gallons, 14 minutes.

All these deliveries were made by one driver, and the average rate was 11½ gallons a minute. Time saved in making deliveries by the meter and hose method, the Bowser company says, effects a considerable saving in delivery costs of furnace oils. With this method of making deliveries, it also is pointed out, the need for a helper on a fuel truck is eliminated.

In the Bowser outfit the hose is permanently connected with the reel, the oil flowing from the meter through a pipe into the hollow axle of the reel and from the axle to a pipe fitting on the drum of the reel. There is a rewinding apparatus which consists of a ring gear and pinion.

* * *

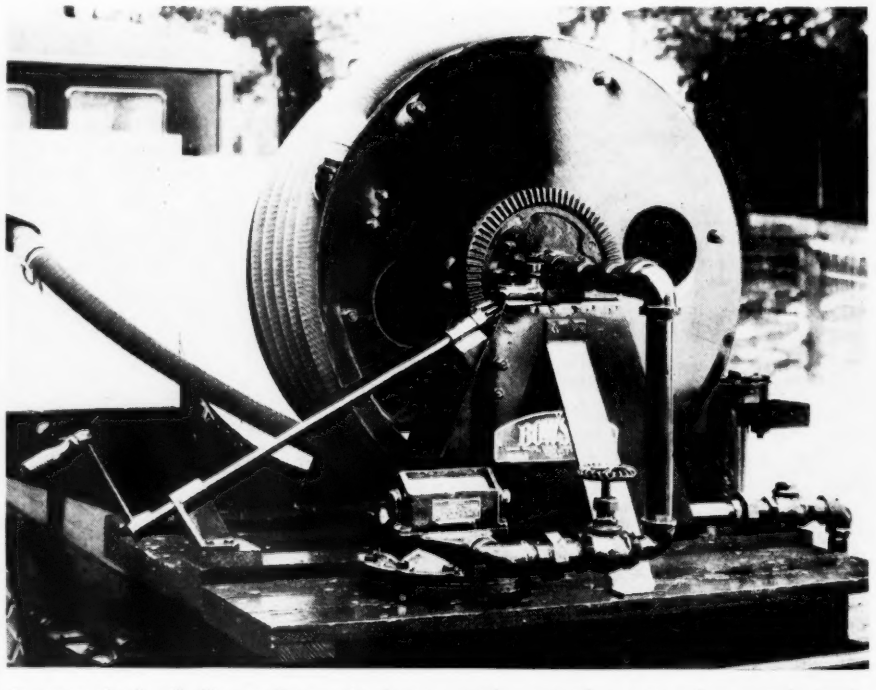
Weaver Mfg. Co., Springfield, Ill., describes its new headlight tester in a recent bulletin devoted to its line of products, which also include the Weaver wheel alignment indicator and brake tester. The headlight tester provides a means of focusing headlights and adjusting them to strike the road at any desired distance from the car with accuracy. It is portable and can be taken to the car instead of the car being brought to it. It is simple and easy to operate and an ordinary job can be done in 10 minutes, according to the bulletin.

* * *

Wilson & Bennett Mfg. Co., 6532 S. Menard Ave., Chicago, maker of steel containers, has appointed H. A. Rogers sales representative at Tulsa.

* * *

Gardner-Denver Co., Quincy, Ill., maker of slush and mud pumps, air compressors, rock drills, etc., has opened an office at Cleveland, O., with C. C. Arnold in charge. The new location will have space for sales rooms and storage.



Bowser fuel oil dispensing unit for mounting at the rear of a truck tank. This unit in tests has delivered an average of 11½ gallons a minute, or a total of 996 gallons in 86½ minutes in seven stops

Broader Merchandising at One-Stop Stations in Pittsburgh

By Roger B. Stafford
N. P. N. STAFF WRITER

PITTSBURGH

DIVERSIFICATION of services and merchandise is common at a great many stations in Pittsburgh and its suburbs. In the last year the growth of one-stop stations has been noteworthy and the development has come mostly through the enterprise of Independent dealers.

There is one elegant one-stop station owned and operated by the Select Tire Stores, Inc., a subsidiary of the B. F. Goodrich Rubber Co., Akron, and numerous other stations which have been built and are being operated by individuals or by companies in which some one or two persons own control.

So far the oil companies as a class have not diversified their stations further than lubrication service and such accessories as may be called convenience goods: particularly light bulbs, because Pittsburgh and Pennsylvania state police are enforcing strictly the two-headlight rule of the automobile regulations. One-eyed cars are not tolerated any further than the nearest filling station or garage.

The one-stop station development cannot be said to be that of the tire dealers, battery men or any other particular group, because tire men, battery men, automobile dealers, and other persons have had enough confidence in their selling ability to back it up with a few thousands of dollars and take a fling at serving the automobile trade.

The gallonage at the Pittsburgh one-stop stations is above the average for city service stations. Fifteen thousands of gasoline a month is common and some of the stations will sell well over 20,000 gallons, they report.

Possibly the Pittsburgh terrain has a great deal to do with the good gallonage at the one-stop stations, which are on well traveled streets or boulevards which run through the valleys or across hillsides and hilltops. The hilly sidestreets prevent the spread of neighborhood service stations as in leveler cities.

Because frontage on the boulevards and arterial streets is high priced, operators find it necessary to get as much use from their land as possible and in their stations one will find almost everything that can be sold to a motorist.

The oil company stations, almost all of them refining company stations, stick more closely to petroleum products and the services affiliated with petroleum, such as oil changing and chassis lubrication. The owners depend for their gasoline profits on their wholesale business with dealers and also their own stations, it is said. It is commonly asserted in Pittsburgh that few if any oil companies can make a profit on gasoline business at their own stations if they charge themselves the tank wagon price, which is 4 cents a gallon under the retail price.

Profits that stations show, must come from motor oil and auxiliary services, or from the enhancement of real estate values, an increment that cannot be realized as long as they continue to hold the real estate.

But the independently owned and operated stations in Pittsburgh are tangible examples and proof of the arguments of tire manufacturers that the one-stop station requires unified management that is best represented by direct owner management.

Take the case of the Hespenheide Service Station at Irwin Ave. and Jackson St. in Pittsburgh's north side, formerly Allegheny. Charles Hespenheide actually lives with his business. His residence is on the second floor of his two-story service station. He is on the job 24 hours a day, often staying up until 2 or 3 o'clock in the morning if business is too heavy for his night man to handle alone. Even after he has retired he is subject to call.

Hespenheide handles gasoline and oils, lubrication, tires, tire repairing, batteries, battery repairing and charging, radios, anti-freeze compounds, and a line of minor automobile needs and accessories.

But gasoline and oil form most of the Hespenheide business, approximately 85 per cent of the station's gross sales come from those two commodities. About 10 per cent of his business is from tires and the remaining part is mostly batteries for cars and radios.

The Hespenheide station cost $6800, the concrete work $2400 and the equipment $8000 to $9000, a total of $17,200 to $18,200 without the land which belongs to Mr. Hespenheide's father's estate, as does all the land and buildings in the block where the station is built.

The station has a gasoline gallon-

An example of good store-keeping at the one-stop station of the Hamilton Motor Co., Ben Avon, Pittsburgh. Back of the shelves in the show cases are drawers in which small hardware is stocked. Samples of the hardware are mounted on the sample boards attached to the ends of the steel cases in which automobile supplies and small parts are kept. All goods are tagged with the prices

An individually owned one-stop service station in Pittsburgh, in which the owner, Charles Hespenheide, has living quarters. This station, without the land and the equipment cost less than **$20,000**, *including the four-room flat on the second floor in which the owner lives*

age of more than 20,000 gallons a month. Three grades are handled: Waverly Blue Moon, a competitive grade; Waverly Ethyl, and Wow, a benzol blend that Waverly Oil Works Co. makes. Meter outlets are used. There are two single outlets in the walls of the station and four double meter outlets on an island. A motor oil fountain also is placed on the island.

There are also two free-wheel lifts outdoors and parking space for six cars at one end of the station lot and three or four at the other. Revenue from parking, Mr. Hespenheide said, paid for the lighting at the station. Other equipment includes tube vulcanizing equipment but no casing vulcanizers.

Air is used for dispensing gasoline, oil and on the lifts. The oil lines from the storage tanks in the basement of the station to the oil fountain are in an air duct so warm air from the basement in winter flows outward and up through the housing of the fountain. The heat is sufficient to keep the oil from congealing in the lines.

ROAD service is one of the features of the station. Calls are answered for tire changes, gasoline, battery service, and towing. Often the calls are made without charge if no great labor is required.

The station employs two men each on two day and evening shifts and one man on the all-night shift. Mr. Hespenheide also works at the station and often has extra help on Saturdays and Sundays.

Mr. Hespenheide is an independent who entered the service station business from the wholesale and retail liquor business. He is now applying to gasoline and oil and tires the training he received in fulfilling public demand. Whenever any line becomes slow he is willing to change it, and at present he is closing out one make of tires and beginning the sale of another make which has won greater favor among Pittsburgh motorists.

In the residential suburb of Ben Avon is a super service station that grew out of an automobile agency. It is the station of the Hamilton Motor Co. and was founded by a man who had years of experience with Pittsburgh's leading department store. His son is continuing the business.

This station is a fine example of good store-keeping. Every piece of merchandise is neatly displayed on shelves, in cases or, in the case of small items on sample boards, with tags giving the price and the location of the supply in drawers which are built into the backs of the show cases.

The Hamilton Motor Co. station developed from an ordinary suburban automobile salesroom with service garage in the rear. The company was formed to take a Dodge Brothers agency and still sells Dodge cars. Several years ago it decided to build a new plant across the street from the one it had occupied and to sell whatever it could in the community.

A salesroom was built contiguous to the sidewalk but the garage for the storing of cars was set back far enough from the street to permit two drives to gasoline pumps. The repair and service shop was built back of the salesroom and offices.

Ben Avon had no hardware store so the station stocked a line of hardware that the average homeowner needed. There were carpenter's tools and garden tools, electrical fittings and light bulbs, screws, bolts, and several hundred other small items which the home owner frequently needs and wants quickly when he does need them.

The things a man needs who tinkers with his own car also were stocked and later radio supplies were added to the merchandise.

A sample of everything carried in the store, which is a good example of what any suburban service station might undertake, is displayed with the price marked in plain figures. The small items are stocked in tills in drawers and a white tag is tied to each sample mounted on boards back of the show cases where radio tubes and the more expensive articles are displayed. The price, and drawer number are written in different colored inks on the tags so any person can quickly find what the customer picks on the board.

CANNED goods like polish, oils, greases, lacquers, and paint are neatly arranged on shelves.

Seasonal goods are displayed in the windows the same as a hardware store would do. One large show window contained an automobile, another anti-freeze compound in cans, and a third a model of a Zeppelin which the company won by selling its quota of Goodyear tires in a contest last summer.

In a window that faced the station drives was a lamp display featuring Light's Golden Jubilee which means a great deal to Pittsburgh, the home of the Westinghouse companies.

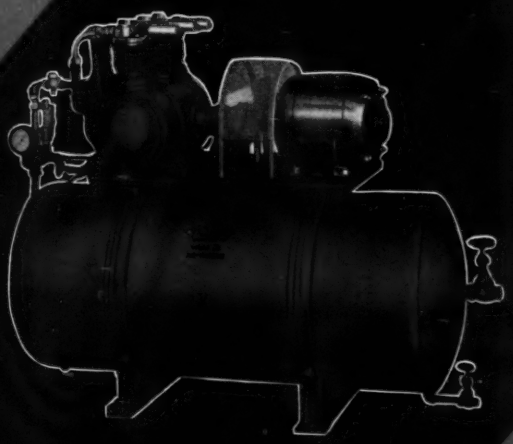
Mr. Hamilton said the turnover on the miscellaneous items was about 15 times a year.

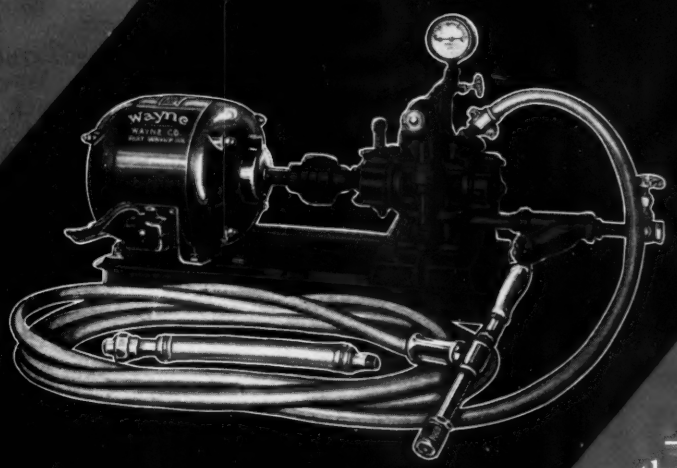
The company has a greasing rack but the rack is back of the garage and out of sight of the gasoline pumps and sales room. It also has a wash rack in the garage. Besides washing cars itself, the rack is rented at $1 a car for use of owners or chauffeurs.

Winter is the best season for the renting, Mr. Hamilton said, because the garage is heated, and warm water is supplied under pressure. Renters must supply their own sponges, chamois and brushes and this requirement leads to the sale of these necessary articles. Most of the renters are chauffeurs for wealthy men whose

~~Wayne~~

Wayne direct-drive, air-cooled, Automotive Type Air Compressors are revelations in design and performance. An important factor in their long life is the operation of the compressor units at speeds from 380 to 425 R.P.M. Compare this to compressors that must operate at full motor speed of 1725 R.P.M. Wayne compressors are available with two, three or four cylinders; forty-four, sixty or eighty gallon tanks and capacities from 2.8 to 14 cu. ft.





The Wayne Car Washers offer the refinement and the exactness of mechanical perfection that is characteristic of Wayne equipment. A time-proven product guaranteed by a Company whose word is inviolate. Direct-drive principle—a pumping unit following closely the lines of fire engine pumps—rotor teeth mesh and unmesh with one-thousandths of an inch clearance, thus preventing wear—over-size motors—ample ratio maintained between amount of water pumped and amount of water discharged.

WAYNE COMPANY

FORT WAYNE, INDIANA

Atlantic Area
FRY EQUIPMENT CORP. DIVISION
Rochester, Pennsylvania

WAYNE COMPANY, LTD.,
Toronto, Canada

Pacific Area
THE BOYLE-DAYTON DIVISION
Los Angeles, California

home garages are not fitted for car washing in winter.

This renting service is regarded by Mr. Hamilton as a convenience service because he would rather have his own men use the laundry exclusively.

The station of the J. J. Hanselman Co., in Millvale, grew from a small garage where Mr. Hanselman stored his car. He was a partner in a tire station and sold his share to the other partner to enter the station business alone. He enlarged the garage, put in a stock of tires and automobile necessities, and three gasoline pumps.

He opened the station June 9, 1924, and said he waited from 7 a.m. until after 11 before he got his first customer. His first day's receipts were $17.65. Now the sales are averaging more than $6000 a month and he is moving between 15,000 and 20,000 gallons of gasoline a month. He sublets his tire repair work on a 20 per cent margin but does his own battery work and recharging. His tire sales average a little better than one casing a day. He also was displaying a Zeppelin trophy for overselling his quota of Goodyear tires.

Mr. Hanselman's gasoline and oil sales constitute 65 to 70 per cent of his gross sales, he said. Tires and tubes make up about 20 per cent and batteries and accessories about 10 per cent. He does no lubrication work except changing crankcase oil but is considering putting in a pit. He employs four men at the station and also spends every day there himself. His home is immediately back of the station on a hillside.

Radios are now forming a good source of income for the Linden Service Station, which sells one-stop service in Bellevue, another Pittsburgh suburb. As high as two radios a day have been sold lately at a gross margin of approximately $40 for each instrument.

The Linden station has a one-stall wash rack, two indoor lubrication pits and four outdoor pits. It sells Firestone tires, tubes and batteries. Its repair work is sublet at a 40 per cent margin. It sells Waverly gasoline and oils and Alemite greases.

The station also stocks automobile requirements such as spark plugs, bulbs, gasoline tank caps, tire kits, tire valves, and other emergency supplies.

The Clausner Tire Co., another Waverly dealer, has a location like one dreams about but seldom realizes. It is at the intersection of two important streets at the edge of Pittsburgh's famous Golden Triangle and is in a head-on position for the heavy automobile traffic from Pittsburgh's South Side that enters the Triangle through the Liberty vehicular tubes and cross the Liberty Bridge over the Monongehela river.

The Clausner station has been ingeniously laid out on a small V-shaped lot. It has six pumps, arranged three on each of two crescent-shaped islands. The shape of the island is necessary to permit easy movement of cars through the station, which may be entered from the side street, the end street, or head on from the Liberty bridge approach. It is just as easy for cars coming across the bridge to drive through the station as it is for them to drive into Sixth avenue on their way into the business district. This accessibility has brought a gasoline gallonage of close to 1000 gallons a day.

It is necessary to drive past the gasoline pumps to reach the other service of the station—tires, lubrication and washing.

A feature of the station is the large sign which the driver cannot overlook as he drives across the bridge. The background of the sign is white and the lettering and numerals and hands of a large clock are red. The lettering is outlined with red neon tubes and the numerals and hands of the clock also have neon tubes. The sign and clock are visible even on foggy days.

The station has three large display windows which are kept well trimmed.

English Jobbers Consider Bus Stations

CLEVELAND, Nov. 28.—English oil jobbers are becoming interested in the type of service station found in the country and small towns of the United States where busses stop for gasoline and oil while the passengers obtain lunch or light refreshments.

An article on this type of station is published in the November issue of The Service Station, London, accompanied by comments and an illustration from an article published in NATIONAL PETROLEUM NEWS, March 20, page 101.

Railroads in England have been granted permission to operate bus lines to compete with existing bus competition. The article points out that there is a limited field at present for a station catering to passengers and the bus. Prospective operators of such stations are advised to obtain confirmation from bus officials that busses will stop before building stations.

MILWAUKEE, Nov. 29.—The Sterling Motor Truck Co., Milwaukee, Wis., announces the opening of a new factory branch at 51 Forest Ave., West, Detroit. In addition to a large display room, it has a completely equipped service station and repair parts department.

An ingeniously laid out one-stop station on a small lot at the edge of Pittsburgh's Golden Triangle. Note the crescent-shaped pump islands which permit easy movement of an automobile through the station in spite of the small drive space. The sign has neon outlined letters, clock numerals and hands

Oldest and Largest Manufacturers of Trailers

Semi-Trailers
4-Wheel Trailers
Adjustable Pole Trailers
Heavy Duty Carryalls

Fuel Oil Distribution Brought up-to-date

The Fruehauf Semi-Trailer unit pictured above is probably one of the most up-to-date pieces of equipment operating today in Fuel Oil delivery service. The Trailer is a Fruehauf Standard Drop Frame job of 3-tons capacity and is fitted with a 1000-gallon tank. Back of the cab a reel holding 150 feet of wet hose is mounted together with a rotary pump and a meter. With such equipment it is easily possible to fill the consumers tank from the curb, thus eliminating the possibility of breaking down the driveway or spoiling the lawn. The large carrying capacity of the outfit removes the necessity of frequent trips to the plant for reloading.

The Oil Division of the Fruehauf Trailer Company will be glad to cooperate with you in solving your haulage problems. They will make a careful study of your requirements and from their findings recommend the transportation system which they believe to be most efficient and economical. Just write us stating your haulage needs and describing your present equipment.

FRUEHAUF TRAILERS
DETROIT
REG. U. S. PAT. OFF.

Fruehauf Trailer Company

10962 Harper Avenue **Detroit, Michigan**

Flat Allowance, or Company Car, Provided Oil Salesmen

By E. L. Barringer
N. P. N. STAFF WRITER

CHICAGO

MANY oil companies are meeting the automobile expenses of their salesmen with flat monthly allowances, or the company owns and maintains the cars, rather than with a mileage allowance. A check of seven oil companies showed that four used the flat monthly allowance, two companies had salesmen on the road in company maintained cars, and one company preferred other means of transportation.

The companies protect themselves against suits arising from accidents while salesmen are on company business by carrying liability and property damage insurance. One large company carries its own insurance. Another large company, the salesmen owning their cars, buys full coverage except collision. This insurance protects the car whether in private or business use.

There was no agreement as to what type of car was used most extensively by the sales force. Two large companies owning their cars concentrate on two well known makes of small cars. Another company up to five years ago provided the sales force with a well known small car, but discontinued this method when the salesmen complained. This company now gives salesmen an allowance for using their own cars.

One company assists its salesmen in buying a car if they have none when employed. A car in the $1000 field is purchased, depreciated in 20 months and turned over to the salesman as his property. The salesman receives an allowance during the 20 months for operating expenses, and when the car is turned over he receives an additional check for depreciation.

The companies interviewed were the Barnsdall Refineries, Inc., the Standard Oil Cos. of Indiana and of Ohio, Empire Oil & Refining Co., Burford Oil Co., Sinclair Refining Co., and a Mid-Continent company not wanting its name used.

The following data is based on the average run of salesmen. There are exceptions, of course, where a salesman might be driving a high-priced car when the occasion demands, or where a representative of the marketing departments needs to make an impression.

Salesman for Barnsdall Refineries, Inc., own their own cars. They are paid $50 a month for depreciation plus $60 a month for operating expenses. Checks for these amounts are mailed each month, separate from the pay check.

If a salesman is employed by Barnsdall who does not have a car the company purchases one in the $1000 field. The car is depreciated $50 each month on the company's books. At the end of 20 months the car is given to the Salesman.

During the 20 months in which the auto is being depreciated the company pays the salesman $60 monthly for operating expenses. When the auto is turned over Barnsdall begins paying the $50 a month depreciation to the salesman.

In case the recently employed salesman owns his own car the $50 and $60 monthly payments begin at once.

Types of autos driven varies with the salesman. Some own light cars, others drive heavier, more expensive makes. In one case in the Chicago territory a salesman is driving his fourth car in two years. Most salesmen without families drive a coupe or coach model. Salesmen with children are inclined to purchase a sedan.

Barnsdall protects itself with personal property and public liability insurance. This protection is carried by the company.

When a salesman uses a railroad train or other forms of transportation than his auto he does so at his own expense unless specifically directed to do so by his office. In northern territory where roads may be blocked in winter a salesman may be directed to get by train to some large city where he can make numerous calls to tide him over until the weather breaks.

The Standard Oil Co. of Indiana owns its salesmen's autos, provides gasoline and oil and all repair service. The salesmen has no automobile expense account to report except in emergency cases when he may have repairs made on orders from his office.

A light type of car is used by Standard of Indiana. These cars are kept on the road for their life, and traded in when the repair department reports the auto has outlived its usefulness.

Records formerly were kept showing the cost per mile and per auto, but about eight years ago these records were abolished. All expense is lumped now and there is no detailed record of salesmen transportation costs. The savings in bookkeeping expense is believed to offset any advantage of knowing the cost per salesman mile.

Salesmen on the road obtain their petroleum requirements from Standard stations, signing for the purchase. Mechanics in charge of repairing trucks inspect the salesmen's cars and keep them in shape. There is no definite routine for these inspections. Some salesmen require servicing the car every few days while other autos are inspected infrequently. Length of route, road conditions, and type of driver are factors the mechanic considers in routing his servicing work.

The Standard of Indiana carrys its own insurance.

The Burford Oil Co. pays each salesman $100 a month for depreciation and operating expense. The salesmen own their cars. This $100 is paid through the year and if the salesman uses some other means of transportation he pays his traveling expenses.

Salesmen for the Sinclair Refining Co. own their cars. When employed the company executes a contract for the use of the car, providing remuneration on the basis of a certain amount for each day the car is used. The amount specified varies with the territory covered.

Four times a month Sinclair salesmen turn in expense accounts for all expenditures, listing auto expense at so many days at the agreed rate. Auto expense is not allowed for more than six days of the week.

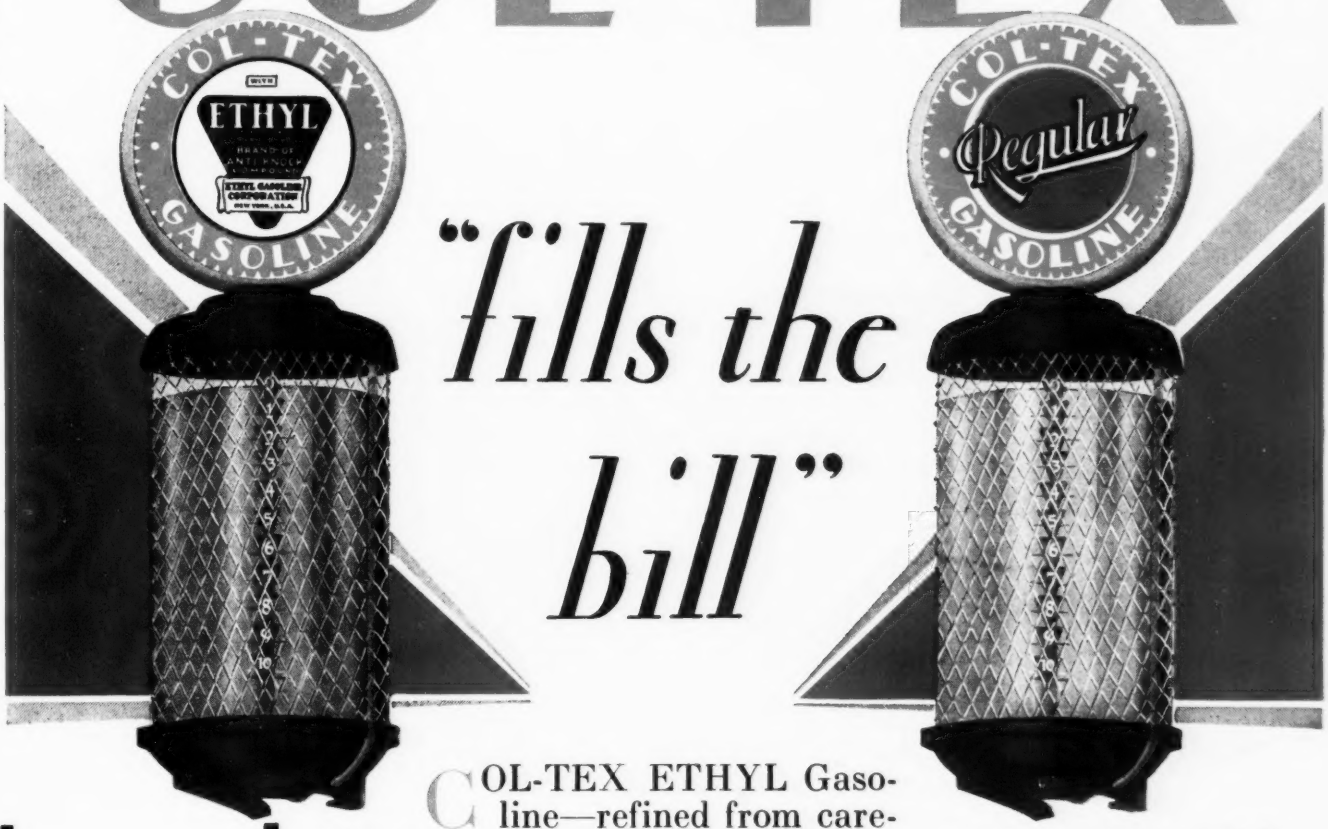
Sinclair carries full insurance coverage on the salesmen's cars excepting collision. This coverage protects the salesman when he is using his auto for private as well as company use.

Another oil company, which does not want its name known, pays salesmen from $35 to $75 a month for the use of their autos. Until about five years ago this company provided a light type of auto for salesmen, but when salesmen objected to the car furnished the company turned to its present method of salesmen owning their cars.

Based on records and experience of company operated cars this concern has worked out the $35 to $75 allowance, depending on the territory.

This company protects itself on pub-

COL-TEX



"fills the bill"

COL-TEX ETHYL Gasoline—refined from carefully selected crudes—is rich in natural "anti-knock" properties. COL-TEX ETHYL has low initial boiling point and endpoint; every fraction is extremely volatile, and with the addition of ETHYL,—is a high test, "anti-knock", all-purpose motor fuel.

COL-TEX REGULAR Gasoline, made from the same crudes, has sufficient natural "anti-knock" properties to make it an outstanding motor fuel. COL-TEX REGULAR provides instant power, quick starting, long mileage—and is an ideal non-premium gasoline winter and summer.

COL-TEX ETHYL and COL-TEX REGULAR "fill the bill". They contain every quality the most exacting motorist requires.

Get in touch with us immediately for details of our marginal contract covering 1930.

IMPORTANT:-

SUPER-KEROSENE

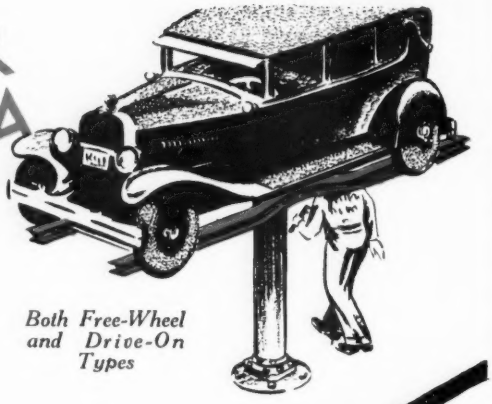
42/4 gravity, low flash and endpoint, together with **ZERO FURNACE OIL**, are now available for contract over the winter season.

ANDERSON-PRICHARD OIL CORPORATION
COL-TEX REFINING COMPANY

PRODUCERS AP REFINERS

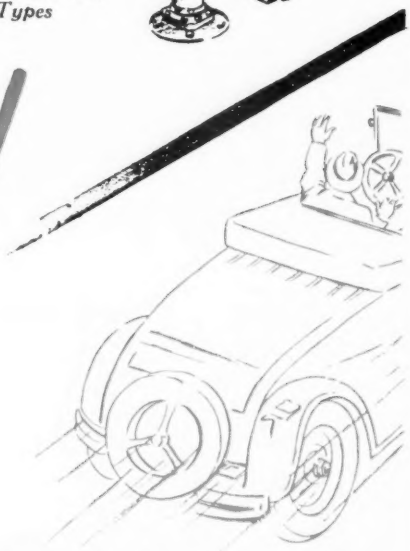
OKLAHOMA CITY, OKLA.

ANOTHER OTTAWA



Both Free-Wheel and Drive-On Types

To Increase Your Profits



The new OTTAWA, priced amazingly low—within the reach of every station owner—offers unequalled value in a hydraulic—air operated—rotating lift to handle all makes of passenger cars and many of the trucks.

With the addition of this new lift, supplied in either free-wheel or drive-on types, OTTAWA now offers four outstanding models to choose from.

OTTAWA Lifts give easy, economical operation, absolute safety and dependability—simple, low cost installation—operates from ordinary air compressor—lifetime service construction—only one moving part, nothing to wear out or go wrong. OTTAWA speeds up jobs, improves service, pleases customers, *increases profits!*

Every OTTAWA LIFT installed has quickly paid for itself in increased business and the new low-priced OTTAWA offers all improvements and advantages of the higher priced models—bringing you increased profits at this low cost

ONLY $245 F.O.B. OTTAWA

Write today for full particulars—also prices of Ottawa Visible Gasoline Pumps, Air Towers and Air Compressors.

OTTAWA MANUFACTURING CO.

"Machinery Builders for 30 Years"

228 Fuller Street **Ottawa, Kansas**

NORTH AMERICAN CAR CORPORATION
N.A.
A big fleet of *modern* cars;
4 large, privately owned shops to keep them in condition;
18 years' specialized experience;
SPECIAL *services to shippers, described on request. Address*
NORTH AMERICAN CAR CORPORATION
327 S. LaSalle St., Chicago, Ill.
Tank Cars for Lease. Domestic and Export Terminals Chicago, Tulsa, New Orleans.

lic liability and property damage, the salesman paying for the policy which is held in the company's files.

Salesmen's auto allowances are cut off in case the man uses other means of transportation under orders from the company.

The Empire Oil & Refining Co. does not allow salesmen to use automobiles. Train, boat, or other means of transportation are used exclusively. The salesman enters his transportation costs along with other traveling expenses.

Company owned and maintained cars are used by salesmen of the Standard Oil Co. of Ohio. Light cars are used exclusively for this service. While three years is the average life of a salesman's car some are turned in sooner.

Gasoline, motor oil, and greasing jobs are obtained from the company's stations. Repairs are made at auto dealer garages and the bill paid direct by the company.

The only auto expense paid direct by the salesman is for tire repairs or motor trouble on the road where it would be impossible to get to the dealer's garage. In such a case the salesman pays the bill, puts it on his regular expense account with the receipted bill.

When an auto is to be traded in the dealer's allowance is scrutinized by a company mechanic. These mechanics inspect the motor transportation units regularly, and look over the salesmen's autos before traded in. This inspection by the mechanic is a check on whether or not the trade in allowance is fair.

Most of the cars do not make long trips. Standard operates only in the state of Ohio and has many division points from which the salesmen work. While some cars are driven long distances, most of the salesmen cover a territory surrounding one bulk station.

A new system for checking automobile expense was installed at the home office in Cleveland, O., last spring. Each motor transport and automobile has a separate file in which is kept all expenses incurred by the unit.

Ohio Code Committee Discusses Leases

CLEVELAND, Nov. 28.—Service station lease agreements were discussed by the Ohio committee on interpreting the code of ethics which met here Nov. 22 in the office of Hubert Fuller, attorney for the Ohio Petroleum Marketers Association.

The committee has found much opposition in Ohio to the code on account of the lease agreement being used by some large companies in obtaining dealer outlets. The code does not cover the lease agreements. No action was taken by the committee.

Cooling System Capacities for Blending Solutions to Prevent Freezing

BELOW are the capacities in quarts of virtually all models of cars on the roads today. These capacity figures may be used in connection with the table for the blending of anti-freeze solutions published on page 26 of NATIONAL PETROLEUM NEWS for Nov. 13, 1929.

Auburn 6-66, 1926	17½
Auburn 6-66, 1927	14
Auburn 8-77,8.88, 1926-1927	20
Auburn 76, 1928	15
Auburn 88, 1928	16
Auburn 115, 1928	20
Auburn 6-80, 1929	19
Auburn 8-9, 1929	22
Auburn 20, 1929	25
Blackhawk L6	24
Blackhawk L8	26
Buick Standard 1926-27	12
Buick Master 1926-27	18
Buick 115, 1928	16
Buick 120 & 128, 1928	20
Buick, 116, 40, 1928-29-30	17
Buick 121 & 129, 1928-29	22
Buick 50 & 60, 1930	22½
Cadillac 314	22
Cadillac 341 A-341 B	24
Chandler 35, 1926-27	20
Chandled Special 6	16
Chandler Standard 6	10
Chandler Royal 8 and Big 6	22
Chandler 65	12
Chandler Royal 75	17
Chevrolet 1929	10
Chevrolet 1926-27-28	8
Chrysler 52 & 66, 1929	14
Chrysler 58, 1925-26	13
Chrysler 60, 1929	12
Chrysler 62	11
Chrysler 70, 1925-26-7	16
Chrysler 72	17
Chrysler 80, 1927-27	20½
Chrysler 65	13
Chrysler 75	15
Chrysler 70, 1929	18
Chrysler 77, 1929	21
Chrysler Imperial 80, 1929	19
Cord	28
Cunningham	29
De Soto	10
Diana	18
Dodge 4, 1929-28	11
Dodge Standard, 1928	13
Dodge Senior 6, 1928-1929	17
Dodge Victory 6, 1928	12
Dodge 6, 1929	16
Duesenberg, 1929	28
duPont, 1929	26
Durant 55, 65, 60, 63, 66, 1929	12
Durant 75, 70, 1929	14½
Durant 40, 1929	8
Elcar 6-70	13
Elcar 8-82	17
Elcar 8-90	21½
Elcar 8-78	16
Elcar 8-91, 8-92-120, 1929	22
Elcar 75, 1929	14
Elcar 95 & 96, 1929	18
Erskine	13
Essex all 6's	19
Flint E-80 & 55	19
Flint Z-18	11
Flint 60	13½
Flint 80	18
Ford Model A	12
Ford Model T	12½
Gardner 6-B, 75, 80, 85-88, 90 & 95	17
Gardner 8-B, 1926	19
Gardner 136, 140, 150, 1929	23
Graham-Paige 610, 614, 615	20
Graham-Paige 619, 629, & 835	26
Graham-Paige 612	18
Graham-Paige 621	25
Graham-Paige 827 & 837	27
Hudson 1924-1927	16
Hudson 1928-1929	22
Hupmobile 6, 1926-27-28	13
Hupmobile 8, 1925-26-27	19
Hupmobile Century 8	22
Hupmobile Century 6	13
Jewett New Day 6, 1926-27	12
Jordan A, 1926-27	20
Jordan J 8, E 1926-29	17
Jordan R	12
Jordan JE	20
Jordan G & T, 1929	18
Kissel 6-70, 6-73, 1929	16
Kissel 8-80, 8-80S, 8-95, 1929	20
Kissel 8-90 & 8-126, 1929	24
LaSalle, 1928	20
LaSalle 328, 1929	21
Lincoln 1925-26-27	30
Lincoln 8, 1928-29	32
Locomobile Jr. 8 all years	18
Locomobile 48, 1924-25-26-27	32
Locomobile 48, 1928	29
Locomobile 90, 1929	19
Locomobile 8-70	14
Locomobile 8-70, 1928	21
Locomobile 8-80, 86, 88	23
Locomobile 48, 1929	27
Marmon 6, 1924-25-26-27	22
Marmon 8	18
Marmon 68, 1928	18
Marmon E75, 1928	22
Marmon 68 & 78, 1929	20
Marquette	12
McFarlan Straight 8 & TV	20
Moon A-6, 1924-25-26	15
Moon 6-60	12
Moon 6-72	14
Nash Light & Standard 6, 1926-27-28	11
Nash Advanced & Special 6, 1926	22
Nash Advanced 6, 1927-28	22
Nash Special, 1927	20
Nash Special, 1928	16
Nash Advanced, 1929	19
Nash Special, 1929	17
Nash Standard, 1929	10
Oakland, 1925-26-27	12
Oakland 6, 1928	11
Oakland AA6, 1928	12
Oakland AA6, 1929	22
Oldsmobile 6, 1925-26-27	12
Oldsmobile 6, 1928-29	13
Overland 4-96, 1926	8½
Overland 4 Whippet	11
Overland 6, 1926-27	12
Overland Whippet, 96A, 1929	11½
Overland Whippet, 98A, 1929	15½
Packard 6, 1925-26-27	17
Packard 6, 1928; 6-26 & 6-33, 1929	20
Packard 8, 1925-26-27	24
Packard 8, 1928; 6-40 & 6-45, 1929	25
Paige 6-45	12
Paige 6-72 & 6-65, 1926-27	22
Paige 8-85	23
Peerless 6-72, 1925-26	18
Peerless 6-72, 1928	13
Peerless 6-80 & 6-90	14
Peerless 8-69, 1926-27-28	24
Peerless 6-60, 1928	12
Peerless 6-80 & 6.91, 1928-29	14
Peerless 6-61, 1929	12½
Peerless 6-81, 1929	13½
Peerless 125, 1929	20
Pierce-Arrow 33, 1925-26-27 & 133 & 143, 1929	26
Pierce-Arrow 80 all years	22
Pierce-Arrow 81	21
Plymouth	14
Pontiac, 1926-26-28	10
Pontiac, 1929	14
Reo T6, 1924-25-26	14
Reo Flying Cloud before 1929	16
Reo Wolverine & Mate, 1929	14
Reo Flying Cloud Master, 1929	19
Rolls Royce, Silent Ghost	36
Rolls Royce, New Phantom	32
Roosevelt	22
Star 4, 1924-25-26-27-28	8
Star 6, 1926-27	12
Stearns-Knight 75, 1925-26	20
Stearns-Knight 95, 1925-26	28
Stearns-Knight F6-85	26
Stearns-Knight G8-85	28
Stearns-Knight H & J & 8-90	28
Stearns-Knight M & N	18½
Studebaker Standard, all years	17
Studebaker Special, 1925-26	18
Studebaker Big 6, 1926-27	19
Studebaker Dictator before 1929	14
Studebaker Commander, 1928	20
Studebaker President 8, 1928	20
Studebaker Dictator 6 & 8, 1929	15
Studebaker Commander 6, 1929	17
Studebaker Commander 8, 1929	14
Studebaker President 8, 1929	21
Stutz 8, 1926-29	28
Velie 60, 1925-26	19
Velie Standard 50, 1927-28	19
Velie Special 60, 1927	20
Velie 77 & 66, 1928	20
Viking	33
Wills Ste. Clair T6 & W6	32
Wills Ste. Claire C & D 68	26
Willy-Knight 4-65	22
Willys-Knight 66, 1925-26	23
Willys-Knight 66-A & B, 1927-29	21
Willys-Knight 70 & 70B, 1925-29	17
Willys-Knight 56	14
Willys-Knight 70A, 1928	16
Windsor 6-69	12
Windsor 8-82 & 8-92	16
Windsor 6-72 & 6.77	14

Dealer Allows Loafing To Build Business

TIFFIN, Ohio—Loafing is encouraged by J. A. Murphy, operating a roadside drive-in station at Old Fort, a village of several hundred inhabitants near here, in order to build up his business. The air compressor is on all night to serve late motorists as another inducement to trade at the station.

Mr. Murphy has let it be known that he countenances loafing at his station. There is a radio and magazines as well as a table for card playing. From each player in each pot the "house" takes a nickel, a local custom, and the winner of the pot gets his nickel back in a trade check.

In the villages and countryside time often hangs heavy on winter nights, and the men folk like to congregate at the filling station if it has a good stove. Mr. Murphy believes the men will patronize the station, and that he will get acquainted better if he permits loafing.

The station, selling Pennzoil products, was run down by previous lessors. Mr. Murphy is a former minor league baseball umpire, and has been a newspaper reporter and advertising solicitor. He took over the station last July.

Besides having free air on tap all night he is supplying regular customers with free water for batteries. A centralized school is nearby so a stock of tablets, pencils and erasers was put in. Bar candy and tobacco are good sale items, and now the station is selling sweet cider.

The Curtis Pneumatic Machinery Co. and the Automobile Rotary Lift Co. announce that, under arrangements completed Oct. 19, they are the only licensees under the patents issued in 1925 and 1926 to Peter J. Lunati covering the single post rotating automobile lift, the validity of which was upheld in a decision handed down by Judge Anderson in United States District Court at Memphis, Tenn.

MODEL 200

In Home Garages EVERYWHERE

This new Model 200 has popularized the "continuous use oil test" in countless home garages—selling more oil, winning more friends and making new, steady customers for lube-oil marketers.

Replaces Leaky Faucets

Model 200 dispenses oil from the drum in an upright position, in a strong, unbroken stream and cuts off oil flow cleanly. No more fuss with leaky faucets. No more waste oil.

All Metal—Fits All Drum Depths and Various Size Openings

Model 200 is all-metal and so well built that it is capable of handling kerosene, gasoline, alcohol, etc., as well as motor oils. It fits 1½-inch to 2-inch drum openings and has adjustable sliding intake for draining 15 to 16 gallon capacity drums. Handle is malleable and arranged for locking. Heavy one-piece construction, and heavy cast head.

Write for Sales Plans and Bulletins!

Bennett Pumps Corp., Muskegon, Mich.; Service Station Equipment Co., Toronto and Winnipeg; Republic Steel Package Co., Richmond, Calif.; Bennett Export Corp., 32 Broadway, New York.

Bennett Pumps Corporation
QUALITY BUILT
Bennett
Dispensing Equipment
FOR OIL MARKETERS
Muskegon, Michigan.

Motorcycle Tank Wagon Serves Stranded Motor Cars

TULSA, Nov. 29

A NEW idea in the type of machine used to rush service to the stranded motorist has been put into service by the Independent Oil & Gas Co. at Tulsa. The machine is called the "Zipper."

The machine consists of a motorcycle with a specially designed tank, made in the form of a gasoline truck tank. It carries 60 gallons in the three compartments. There are three valves at the rear, and a can box. Even the racks are on the side, and pints and quarts of motor oil can be carried in these racks. In front of the tank is a compressed air drum. There also is the drag chain. The machine is painted red, white and blue, the company colors.

The company advertises all night service with the "Zipper." A stranded motorist can phone to any one of the Independent stations in Tulsa and the call is relayed to the "home station" at Seventh street and Boston avenue.

The cost of the machine was approximately $550. It is easily handled and has proven an attractive advertisement.

The picture was snapped on one of Tulsa's streets while aiding two young women who had neglected to watch the gasoline gauge on the automobile. The machine was designed by O. L. Cordell, formerly in charge of marketing for the company.

160-Foot Long Electric Sign

CHICAGO—The Standard Oil Co. of Indiana recently erected one of the largest electric display signs in Chicago, at 349 East North Water St.

It is approximately 160 feet long and 55 feet high carrying the words, "Red Crown Ethyl Gasoline" in letters ranging from 10 to 15 feet high. A torch approximately 40 feet high will shine at each end of the sign. The sign will flash on and off intermittently and involves the use of 870 lamps.

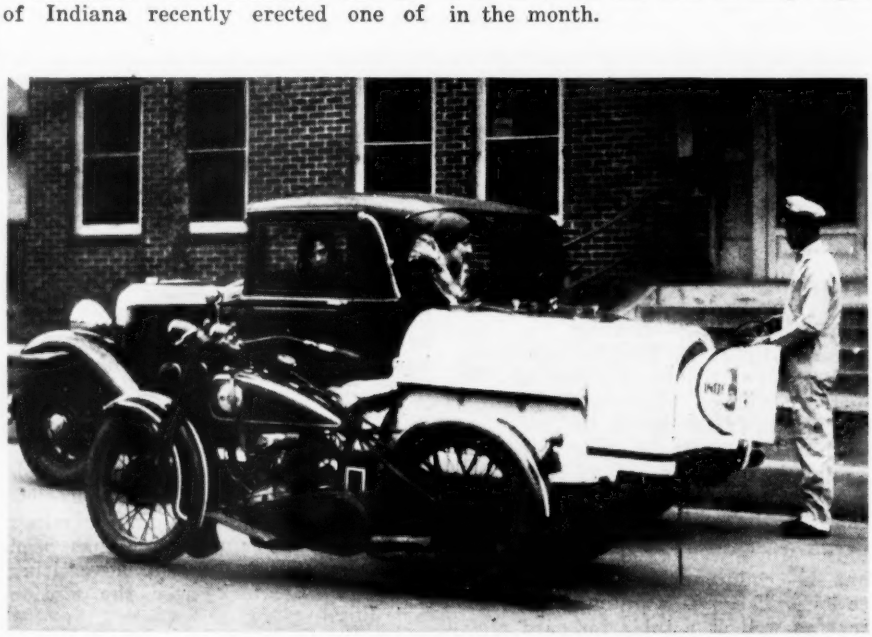
Local Speakers Enliven Employees Meetings

CRAWFORDSVILLE, Ind.—Outside speakers—local merchants or service men—are features of monthly meetings of truck drivers and service station attendants of Geo. W. Deer & Son.

These speakers talk on such subjects as credits, salesmanship, service, condition of equipment, and the like. In addition to giving the men an outsider's slant on business the policy has kept company officials from monopolizing the meetings.

Meetings usually last about two hours. The company provides the smokes and serves sandwiches and soft drinks.

On the second Monday night of each month there is a meeting for truck drivers. The service station attendants meet on the first Monday night in the month.



The "Zipper" aiding two damsels in distress

The Car Dealer and the Servicing Field

POSSIBILITIES for the automobile dealer in the general car servicing field developed by the one-step stations of the oil companies, independent owners and the tire dealers are discussed in the accompanying article by Don Blanchard, editor, in the November issue of Automobile Trade Journal and Motor Age.

In addition to the various arguments for and against the adopting of such a policy by the car dealer, this one might be brought into the discussion also. That is, whether the car dealer, in such an expansion is taking a part of his energy and attention at any rate, from a business in which he has experience and standing, and putting it into a field in which already a considerable degree of competition exists.

Many are the editorials which have appeared in the automobile journals the last year or so exhorting the dealer to a higher degree of merchandising in the selling of cars, to the end the business might be taken away from its present cut-price basis through the allowances offered on used cars.

The more the dealer branches into general car greasing, tire sale and repair car washing, brake aligning and so on, the less attention of the public is going to be focused on his automobile sales business, which might become one department of many at a complete station. His display room, on a street where it gets the attention of motorists and pedestrians, may suffer in the laying out of the complete station.

Then again, the car dealer should not take it for granted he will get a great part of the car servicing business of the people to whom he sells cars, regardless of where they live. Car lubrication, car washing and similar services are now done largely where it is convenient for the motorist. It is problematical how far a car owner would drive to go to the agency where he bought the car to buy his gasoline and get ordinary services such as lubrication and washing done, which are the backbone of business at the one-stop station.

Should Car Dealers Service All Makes

By Don Blanchard

Editor, Automobile Trade Journal and Motor Age

SHOULD car dealers go after maintenance business on all makes of cars at least to the extent of providing such quick services as greasing, washing, battery and brake service, front wheel alignment, etc.?

Or should they continue to limit themselves to the solicitation of service business only from owners of the make of car they represent?

Of course, in the smaller centers it is quite common to find car dealers handling all makes of cars in their shops, but with this exception the usual practice is to service only the make of car handled. The policy is so well established that it is almost traditional.

Should dealers break away from this tradition where conditions are favorable?

Some dealers have. There is a story in this issue about one who has. Earlier this year we printed an article about another. In coming issues there will be other stories about dealers who have gotten into the general service business. Do these instances mark the beginning of a trend?

It is a question that is worthy of serious consideration by car dealers because:

1. Of the changes that are and have been taking place in the nature of the maintenance.

2. Of the probable favorable effects of doing a general service business on merchandise sales. *The contacts made by providing service for all makes can be used to sell cars, equipment and tires.*

3. Of the influence this break from tradition might have on the profits of dealers and their general financial position.

In the past ten years the entire nature of the maintenance business has been undergoing a change. It used to be that the bulk of shop revenue came from major operations. Such operations still do provide an important source of income, but today a very important share of the total maintenance volume comes from smaller jobs, as is shown by the fact that the average sale per repair order has been declining steadily.

The growing number of so-called "super-service" or "one-stop" service stations specializing in a small number of quick-service operations in connection with a filling station business is in part a recognition of this change in the nature of the maintenence business. These stations also are a recognition of the fact that by providing these quick services which car owners need most frequently, customer contacts are created which represent a splendid opportunity to sell merchandise.

Big business sees this opportunity. Most of the larger tire companies are interested in chains of these stations, and some of these chains are growing rapidly. The oil companies, too, are getting into the field. If the contacts created by providing these quick services on all makes will sell tires and other equipment, perhaps they would sell cars too.

Car dealers have not been asleep to this change. While not many of them have gone to the extent of getting into the general maintenance business, a considerable number have centered their maintenance activities on filling a larger proportion of their owners' quick-service needs. Quite frequently their efforts in this direction have taken the form of preventive maintenance plans of one kind or another. Generally speaking, these plans have been designed to stimulate shop sales, and little or no effort has been made to use the customer contacts they create to produce sales of merchandise directly.

As a result of the change in the nature of the maintenance business, it is reasonable to expect a parallel change in the buying habits of the public, and there is reason to believe that this change is taking place. When a trip to a service station meant spending "real" money, as it did when major operations were more common, the question of convenience did not bulk very large in the customer's mind. He was willing to go to some trouble because of the amount

of money involved. But now, when having the car attended to usually means spending a few dollars, convenience is a much more important factor. Car owners want their maintenance handy and they want the work done quickly.

Every car dealer service station is convenient to a certain number of owners. But every car dealer's service station is not convenient to all the owners of the make of car he handles, because, if he is covering his territory properly, some owners necessarily are located at quite a distance. In view of the growing importance of convenience in the maintenance business, the question arises, "Should the car dealer capitalize the fact that his shop is convenient to a certain number of owners by getting into the general service business—at least insofar as the quick services are concerned?"

And, in connection with this question, it should be remembered that, if the car dealer doesn't, somebody else will capitalize the opportunity, if it hasn't been capitalized already.

What will owners of the make of car the dealer handles think about his opening up his shop to all makes? Probably they won't think anything about it as long as they continue to get prompt, courteous, efficient and economical service. That is a problem that must be met by management and the experience of dealers who are doing a general service business along the lines indicated is some evidence that this objection can be met.

How about the effect on car sales? In view of the volume of criticism of service that one hears constantly, there is some reason to believe that it would be a good thing for car sales if the dealer did devote more thought to the development of this end of his business. Certainly there is no more potent car salesman than the satisfaction created by good service.

In addition, having a larger number of owners of miscellaneous makes coming into the shop would be an important sales asset. First, the service they would buy would create confidence and good-will among these owners toward the dealer. Second, it would enable the dealer or his salesmen to get acquainted with them at a much less cost than by "cold turkey" canvass, and thus to find out when they were going to be in the market for a car. With proper sales organization the time the customer spends waiting for his car provides a wonderful opportunity for sales. And, of course, what has been said about the car-selling opportunity created in this way applies also to the sale of accessories, tires, other services, etc.

Some dealers might feel that they might be criticized as "unethical" if they got into the general service business. If it is ethical to solicit new car business from owners of other makes of cars, why isn't it ethical to solicit their service business. Perhaps it's unconventional, but in these days when drug stores are selling floor lamps and grocery stores are selling dishes, it doesn't pay to worry about conventions too much.

It may also be said that if the car dealer went after the service business of his owners aggressively, he could keep his shop full of work. Probably he could. But because of the growing importance of convenience in the maintenance business, he couldn't get all of their work. Moreover, if doing a general "quick service" maintenance business will add to his profits and will stimulate sales of cars and other merchandise, isn't it good business for him to get into the business even if it is necessary for him to expand or reorganize to do so?

With proper equipment and proper organization, the car dealer can handle these quick services at competitive prices and make money provided he promotes the business actively to insure volume. The equipment required for five important quick-service operations and some hints on organization have been given in a series of articles which ends in this issue with one on battery service. Although architectural changes are not essential, architecture does help, and, in this issue also, there is an article showing how alterations in typical dealer buildings may be made. In a coming issue there will be another article showing how facilities can be rearranged in typical buildings without architectural change to feature the quick services. Coming issues also will carry other articles showing how to sell the growing market for the "quick-services" and how to make the cultivation of this market sell other merchandise.

Of course, there are circumstances where it would not prove practical nor profitable for a dealer to reorganize his maintenance business along these lines. For example, where a half dozen or more dealers are located side-by-side in a row, it wouldn't be practical for all of them to adopt super-service methods. But in most communities there is an opportunity for some dealers to operate along these lines profitably.

"Why Stations Lose Sales"

The importance of cleanliness both in the filling station and on the part of operators was so impressed on Mrs. Iva M. Shepard, of the Petroleum Products Co., Eureka, Ill., a reader of NATIONAL PETROLEUM NEWS, *on her trip through the east, that she wrote the following impression of her observations for this publication.*

HAVING recently made a trip through the eastern states, and being interested in service stations, I was a close observer of the many beautiful stations along the route. Many oil companies have large sums of money invested in their stations, making them attractive and convenient, and later have found that they do not have an increasing trade or are not even holding their own.

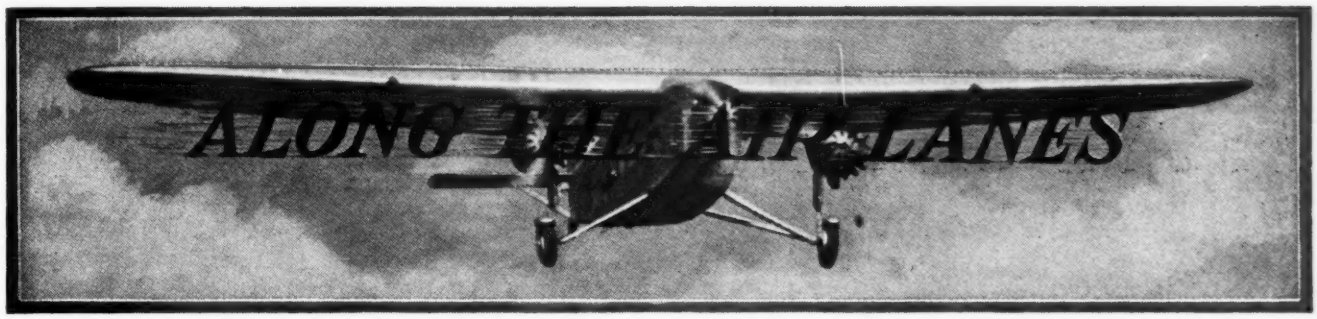
To be a successful enterprise the output of gallonage should show an increase each month or a steady gain each year. Why is this not always true? The first thing to be considered in securing a growing station business is cleanliness which is next to Godliness. Who cares to stop at a dirty filling station?

Even outwardly, appearances sometimes fall short on this score. What if the rest room isn't tidy, lavatory filthy, latches broken on doors? We won't stop in there again. Then again when employing your service man—is he working just for his salary? Above all is he honest, and is he interested in your business enough to try to increase your gallonage?

Your service man can either make or break your filling station. Is he neat and clean? Does he always meet his customers with a smile, pass the time of day and show each customer the same courtesy, or does he come sauntering out of the station, fill up the car, reach out for the change with as much as to say, "Oh this business don't mean anything to me."

A pleasant service man demands respect and can be told even as you enter the station, and the same satisfied customer is coming back to him every time he needs gas or oil. In fact he will drive several blocks out of his road to get this service, or, if a tourist, he will advertise your business at the first camp, which is worth while. Our roads are lined with tourists, coming from every state in the union, some camps housing several hundred people each night during the tourist season.

At the present age, when competition is very keen, new oil companies are springing into existence and new filling stations are going up all over the country, it is up to the investor to be on the alert and to see that he is getting returns from his investment. It is no time to be losing gains or to be asleep on the job.



H. F. WILCOX is another well known oil man who has added his name to the list of oil operators actively interested in aviation. H. F. Wilcox Aeronautics, Inc., with which is affiliated the Collier School of Aeronautics, is getting under way in practically all branches of aviation, including the manufacture of ships, the sales and service of the Warner radial air cooled engine, and the training of pilots. The school is prepared to give instruction in every thing from the fundamentals through and including the knowledge and flying hours necessary to qualify the student for a transport pilot's license.

To the oil-minded public, Homer F. Wilcox is too well known to need any introduction. He discovered what is probably the Mid-Continent's most wide spread and prolific oil sand, the Wilcox. His company, the Wilcox Oil & Gas Co., is well known throughout the Mid-Continent as a producer, refiner and marketer of petroleum.

W. S. Collier, head of the school of aviation, is probably as well known to the air-minded. He can measure his flying time in years, having been at it practically 15 years. He served overseas two years as a pilot during the war. After the war, he was a government aircraft inspector for some time.

During his flying experience Mr. Collier has become imbued with the idea of safety in flying. His students are taught to stunt only that they may know what to do in an emergency, but the idea of straight, safe and sane flying is what is stressed to them throughout their flying course.

There are 107 flying students enrolled at the Collier school, five of them women. Mr. Collier is also in charge of the night school course in aeronautics given by the Tulsa High School.

Present ship building plans for the company include only the construction of a two-place cock-pit training biplane, powered with a 110 horsepower Warner engine. Eventually the company plans to manufacture a cabin monoplane, but the latter is still in the blue print stage. E. S. Addison, for several years with the Tulsa distributors of Cadillac automobiles, is in charge of production for the new company.

Incidentally, it is interesting to note the government requirements which the hopeful builder of a new plane has to fulfill before that plane can be put into production.

First, blue prints of the plane itself, and prints showing the stress test of every part and every piece of material destined to be used in the plane, have to be sent to the Department of Commerce at Washington. These blue prints, totaling between 3000 and 4000, are examined and checked by aeronautical experts in the Department of Commerce. When, and if, these plans are approved, permission is then given to construct two ships.

One of these is used to check specifications and the other for flight testing. The flight testing takes in such points as flying ability, stability, and general air worthiness. If the new type plane passes these tests satisfactorily, a proof type certificate is issued, and the manufacturer may then start producing planes. Each plane that he builds thereafter, will however, be checked by a government inspector.

And it is a comforting thought for the general public, most of whose flying time consists of "passenger hours" that these government inspectors are universally regarded by flying men as really "knowing their stuff," and being particularly hard boiled in seeing that government licensed planes are built to specifications.

The airplane has been corraled for another duty—duck hunting. Week-end trips these autumn days are being arranged by southern California oil men into the marshlands of the north in pursuit of wild foul.

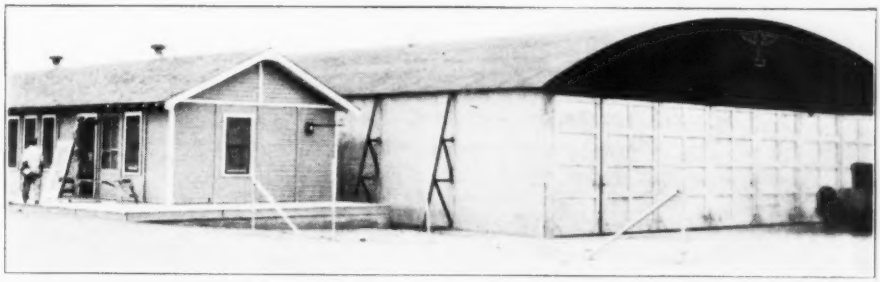
Members of one such trip, who recently returned to Los Angeles with their plane loaded with both ducks and geese, included these oil men: M. L. Boroughs, superintendent of production for the General Petroleum Corp.; Robert Ketchem, purchasing agent and William Linden, both with the same company; C. C. Kifer, district superintendent, Shell Oil Co.; M. G. Brumbly, manager, National Tool & Metals Co.; and J. C. Wright, manager of Weiman, Kamerer & Wright Co., all of Los Angeles. These men were guests of W. A. Trout, vice president and general manager of the Emsco Derrick & Equipment Co., Downey, Calif.

The trip was made to Arbuckle, Calif. in an Emsco Challenger cabin monoplane, which is the first of the tri-motored type built in the new Emsco Aircraft Corp. plant at Downey.

W. L. Seiler, chief pilot for the latter company, piloted the plane.

Oil companies are rising to their opportunities regularly in providing markings for the guidance of aviators. The Texas Pacific Coal & Oil Co., Fort Worth, has marked the top of its 55,000 barrel storage tanks at its Fort Worth refinery, giving directional information.

A total of 1520 airports recognized by the Aeronautics Branch, were in operation in the country the first of October, according to the Department of Commerce, Washington.



The hangar, and next to it, offices and rest rooms, being built at the Wilcox airport, Tulsa

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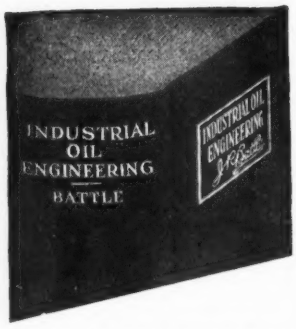

THIS is the third revised edition of INDUSTRIAL OIL ENGINEERING by J. R. Battle. The author is a well known mechanical engineer who has studied the lubrication needs of all types of machinery.

The book contains 1,100 pages of tables, charts, requirements and other information on lubrication and industrial oils. Tells you the most efficient utilization of oil products and equipment; the saving of power and elimination of oil waste.

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Motor Fuel Mixture Patent Refused

WASHINGTON, Nov. 29.—Because an Austrian chemist, April 4, 1914 published the results of his experiments with a mixture composed of gasoline, benzol and toluol in the Pharmazeutische Post, Lawrence F. Magness has been denied a patent on such a mixture by the United States Patent Office. More than that, the denial of a patent has been sustained by the Court of Customs and Patent Appeals. Magness took an appeal.

In an opinion written by Judge Lenroot, formerly senator from Wisconsin, the court sustained the decision of the Commissioner of Patents, that the Vienna publication, that city being the home of the pharmaceutical journal, amounted to a disclosure of a prior art anticipating the discovery or invention claimed by Magness.

The Commissioner of Patents, in deciding against Magness, cited a patent issued to Backhaus, July 3, 1918; the patent to Midgeley, March 11, 1919; an article in the Automobile Rundschau, Berlin, May, 1913 and the Austrian article as showing that the mixture proposed by Magness, in popular language, was old stuff.

Judge Lenroot, however, after examining each said that the Vienna publication was the only one that clearly anticipated Magness. He found that the compounds patented by Backhaus and Midgeley and suggested in the Rundschau article were compounds of petroleum and bituminous coal products differing materially from the commercial articles known as gasoline and benzol, the Midgeley mixture containing kerosene and the Backhaus mixture containing a very volatile petroleum liquid not fit for use, raw, in an engine. Its boiling point was between 104 and 176 F. He said that the prior patents probably pointed the way to the gasoline-benzol-toluol mixture but they did not anticipate the mixture mentioned in the Vienna publication, written by Dr. Karl Dieterich-Helfenberg.

Magness' attorneys were able to differentiate the mixtures made by Backhaus and Midgeley to the satisfaction of Judge Lenroot but not the mixture made by the Austrian doctor of chemistry.

The mixture on which Magness sought a patent was approximately 50 per cent of gasoline and 50 per cent of distillates of the light oils of bituminous coal containing principally benzol and toluol, or of a mixture composed of major quantities of gasoline and benzol and a minor quantity of toluol; or, of a mixture of which the major part is gasoline, a minor part benzol and a still smaller quantity of toluol.

On The Lazy Bench

A New Slant

As a well known landlady once remarked, "Go, and never darken my bathtub again."

—*Mid-Continent Petroleum Courier*

* * *

That's Right

Student: "What happens, sir, if the parachute fails to open?"

Tough Sarge: "You come back, sonny, and I'll give you another one."

—*Mid-Continent Petroleum Courier*

* * *

At Last

Jim: Boss, de ladies hab finally giv in, ain't they?

Boss: Give in? What do you mean?

Jim: Well, I just now seen a sign down the street that said "Ladies Ready to Wear Clothes."

—*Mid-Continent Petroleum Courier*

* * *

Which One

"I can't make this letter out," said the business man to his secretary. "I don't know whether it is from my tailor or my lawyer, both named Smith."

The letter read—"I have begun your suit. Ready to be tried on Thursday. Smith."

—*Mid-Continent Petroleum Courier*

* * *

The Measure

"Dearie, how short should my skirts be?"

Second steno: "Let your chassis be your guide."

—*Mid-Continent Petroleum Courier*

* * *

Sometimes

"Mother, I never see any pictures of angels with whiskers. Do men go to Heaven?"

"Well, some men go to Heaven, dear, but they get there by a close shave."

—*Mid-Continent Petroleum Courier*

* * *

Not Enthusiastic

Golfer to Caddie: "Notice any improvement since last year?"

Caddie: "Had your clubs shined up, haven't you."

—*Mid-Continent Petroleum Courier*

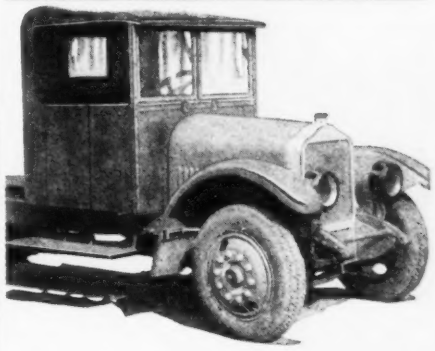
* * *

Only a Rumor

"I understand Jane eloped with one of the boarders."

"You're wrong, it was only a rumor."

—*Magnolia Oil News*



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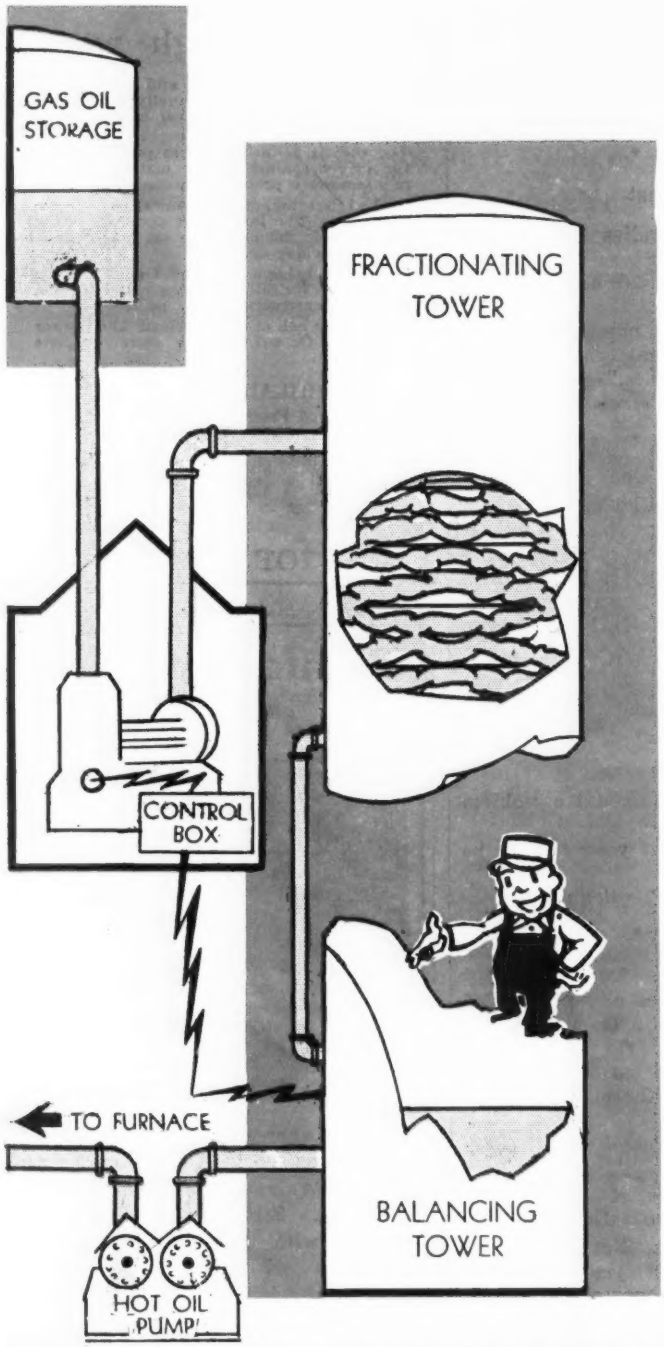
From the Oil Well to the Jobber

This is Chapter Eight of the Story of My Life and Travels.



That part of me which did not materialize, or vaporize, into gasoline, kerosene or distillate in the battery of shell stills but which emerged from the last still as a product known as gas-oil is now about to start its travel towards becoming a marketable product. This gas-oil is to be subjected to tremendous pressure and heat at the same time. By this treatment it will become "pressure" gasoline.

Out of the storage tank I am pulled by a large pump by which I am forced into a fractionating tower. In I go and as I circulate thru a continuous coil downwards I begin to pick up heat from vapors that are emerging from the system. These vapors are rapidly increasing my temperature but by the same contact I am cooling the vapors, helping to fractionate them into better gasoline.

Whew! but I'm warm. Now I'm in the balancing tower. Here, after reaching a certain level, I automatically turn off the stream of other gas-oil following me from the storage tanks. Now I am being sucked out by another huge pump, larger than any I have been thru before. This pump is known as the Hot Oil pump. When it has decreased my level here in the balancing tower to a certain point the pressure will automatically start the gas-oil stream to circulating again. By this balancing method, governed by positive control instruments, uniformity is absolutely assured as to my heat and specifications.

As I am pulled from the balancing tower by this Hot Oil pump and started towards the pressure furnace I find I am being subjected to tremendous pressure,—but wait a minute. I can't tell you about that now. That's part of my story two weeks from today, so be sure and watch for it.

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JUST CALL L.D. 11

Daily Average Crude Oil Production and Imports

Daily average gross output of United States, by fields, for week ending with dates below as compiled by American Petroleum Institute

PRODUCTION SUMMARY

	Nov. 30	Nov. 23
Production east of Rockies	1,933,700	1,933,750
Decrease		50
Total production in U. S.	2,638,200	2,633,250
Increase		4,950
Crude oil imports	181,714	258,300
Decrease		76,586
Total crude supply	2,819,914	2,891,550
Decrease		71,636

OKLAHOMA

	Nov. 30	Nov. 23
Allen Dome	21,400	20,600
Asher	4,200	4,350
Blackwell	3,750	3,750
Bowlegs	25,700	25,550
Braman	3,700	3,700
Bristow-Slick	18,700	18,700
Burbank	17,500	17,650
Carr City	9,550	10,100
Cromwell	7,600	7,600
Cushing	15,700	15,700
Davenport	1,300	1,300
Duncan District	8,450	8,500
Earlsboro	73,550	61,450
East Seminole	4,950	4,500
Fox	1,300	1,300
Garber	4,900	4,900
Graham	3,900	3,900
Healdton	12,650	12,650
Hewitt	7,850	7,850
Hubbard	1,700	1,700
Little River	70,100	67,600
Logan County	14,700	15,650
Maud	8,350	9,000
Mission	14,500	15,800
North Okmulgee	11,300	11,250
Oklahoma City	55,700	64,200
Osage (outside Burbank)	26,700	26,750
Papoose	3,200	3,200
Pearson	850	850
St. Louis	52 000	51,850
Sasakwa	11,100	8,700
Scholem-Alechem	13,800	13,750
Searight	9,350	9,450
Seminole	24,200	25,350
South Okmulgee	7,050	7,000
Thomas	650	600
Tonkawa	8,800	8,800
Wewoka	4,350	4,350
Yale-Jennings	7,300	7,300
Others	55,550	55,850
Total, Oklahoma	648,900	643,050
Increase		5,850

KANSAS

Augusta-Fox Bush	3,000	3,000
Churchill	5,350	5,400
Eldorado-Towanda	12,900	12,900
Florence-Covert	1,050	1,050
Greenwood County	21,500	21,450
Oxford	3,400	3,450
Peabody-Elbing	3,150	3,150
Rainbow Bend	1,150	1,150
Russell	3,200	3,200
Sedgwick County	22,900	22,900
Others	32,200	33,000
Total, Kansas	109,800	110,650
Decrease		850

NORTH LOUISIANA

Bellevue	650	650
Caddo, light	10,250	10,800

	Nov. 30	Nov. 23
Caddo, heavy	2,950	2,900
Cotton Valley	2,500	2,500
De Soto and Red River	3,000	2,900
Elm Grove	550	500
Haynesville	4,800	4,850
Homer	3,750	3,700
Pleasant Hill	800	1,400
Urania	5,500	5,550
Zwolle	2,000	.....
Others	650	700
Total, North Louisiana	37,400	36,450
Increase		950

ARKANSAS

Champagnolle	5,250	5,500
El Dorado	4,300	4,300
Lisbon	1,150	1,100
Nevada	1,050	1,050
Smackover, light	5,800	5,800
Smackover, heavy	44,350	45,100
Stephens	1,000	1,000
Others	100	100
Total, Arkansas	63,000	63,950
Decrease		950

TEXAS (Outside Gulf Coast)

Panhandle District

	Nov. 30	Nov. 23
Carson County	10,100	9,600
Gray County	62,200	64,400
Hutchinson County	27,500	27,000
Wheeler County	800	700
Others	700	900
Total, Panhandle Texas	101,300	102,600
Decrease		1,300

North Texas

Archer County	18,300	18,050
Burkburnett	9,500	9,300
Electra	11,650	11,400
Iowa Park and K. M. A.	4,800	4,650
Montague-Cooke	14,900	15,050
Wilbarger	29,500	29,950
Others	900	900
Total, North Texas	89,550	89,300
Increase		250

West Central Texas

	Nov. 30	Nov. 23
Brown County	10,500	10,600
Callahan County	3,400	3,400
Coleman County	6,500	7,000
Eastland-Desdemona	6,500	6,550
Jack County	3,700	3,700
Palo Pinto County	550	550
Shackleford County	9,500	9,500
Stephens County	6,300	6,300
Throckmorton County	600	600
Young County	7,300	7,200
Others	1,500	1,450
Total, West Central Texas	56,350	56,850
Decrease		500

West Texas

	Nov. 30	Nov. 23
Crane and Upton Counties	44,350	44,000
Crockett County	2,100	2,300
Howard County	41,700	40,000
Jones County	2,550	2,600
Mitchell and Scurry Counties	2,500	2,500
Pecos County	144,550	141,000
Reagan County	17,300	17,000
Winkler County	99,050	105,000
Others	2,950	2,850
Total West Texas	357,050	357,250
Decrease		200

East Central Texas

Boggy Creek	3,400	3,100
Corsicana-Powell	6,800	6,900
Currie	400	400
Mexia	5,000	5,000
Nigger Creek	350	350
Richland	300	300
Van Zandt County	300	300
Wortham	1,000	1,000
Total, East Central Texas	17,550	17,350
Increase		200

Southwest Texas

Dale	350	350
Laredo District	9,100	9,300
Luling	10,800	10,750
Lytton Springs	900	900
Refugio County	16,000	16,200
Salt Flat	32,200	32,800
Somerset	1,600	1,700
Others	2,000	2,650
Total, Southwest Texas	72,950	74,650
Decrease		1,700
Total, Texas (Outside Gulf Coast)	694,750	698,000
Decrease		3,250

GULF COAST

Coastal Texas

Barbers Hill	21,050	20,700
Batson	1,300	1,300
Big Creek	3,950	4,800
Blue Ridge	2,700	2,400
Boling	1,300	1,300
Damon Mound	500	500
Fannett	1,600	1,900
Goose Creek	5,400	5,400
Hull	10,050	10,250
Humble	16,400	18,200
Orange County	3,200	3,250
Pierce Junction	11,250	11,500
Raccoon Bend	9,100	9,000
Saratoga	950	900
Somerville	1,600	1,600
Sour Lake	2,550	2,550
South Liberty	5,650	5,700
Spindletop	19,800	20,600
Sugarland	11,700	13,600
West Columbia	6,400	6,000
Others	5,950	6,900
Total, Coastal Texas	142,400	148,350
Decrease		5,950

Coastal Louisiana

East Hackberry	1,950	1,950
Edgerly	650	600
Evangeline	1,500	1,500
Lockport	3,700	3,700
Old Hackberry	2,800	2,700
Sorrento Dome	50	.....
Sulphur Dome	6,200	6,100
Vinton	4,500	4,400
Others	2,200	2,350
Total, Coastal Louisiana	23,550	23,300
Increase		250
Total Gulf Coast	165,950	171,650
Decrease		5,700

ROCKY MOUNTAIN

Wyoming

	Nov. 30	Nov. 23
Big Muddy	2,100	2,100
Elk Basin	650	700
Grass Creek	2,150	2,000
Labarge	2,050	2,500
Lance Creek	150	150
Lost Soldier	3,150	3,050
Oregon Basin	4,550	4,550
Rock Creek	2,250	2,250
Salt Creek	33,050	30,700
Others	4,650	4,500
Total, Wyoming	54,750	52,500
Increase		2,250

Montana

Cat Creek	1,250	1,250
Pondera	2,450	2,400
Sunburst	6,800	6,800
Others	50	50
Total, Montana	10,550	10,500
Increase		50

Colorado

Florence	900	600
Fort Collins	1,850	1,800
Moffat (Craig)	1,200	1,050
Others	1,700	1,650
Total, Colorado	5,650	5,100
Increase		550

New Mexico

Artesia	850	850
Balance Lea & Eddy Counties	4,050	4,450
Hogback	400	550
Rattlesnake	1,650	1,650
Table Mesa	100	100
Others	400	400
Total, New Mexico	7,450	8,000
Decrease		550
Total, Rocky Mountain	78,400	76,100
Increase		2,300

CALIFORNIA

	Nov. 30	Nov. 23
Dominguez	8,500	8,500
Elwood-Goleta	38,000	35,000
Huntington Beach	42,000	42,000
Inglewood	23,000	23,000
Kettleman Hills	10,000	10,000
Long Beach	106,000	108,000
Midway-Sunset	72,500	72,500
Santa Fe Springs	160,000	160,000
Seal Beach	30,000	29,000
Ventura Avenue	60,000	55,000
Others	154,500	156,500
Total, California	704,500	699,500
Increase		5,000

EASTERN

(Not including Michigan)	120,000	118,900
Increase		1,100

MICHIGAN

Mt. Pleasant	7,750	7,200
Muskegon	7,500	7,600
Saginaw	250	200
Total, Michigan	15,500	15,000
Increase		500

Compilation Of Mid-Continent Refinery Operations

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Mid-Continent Refinery Operations Week Ended November 29 (By Telegraph)

	Kansas	Oklahoma	North & Cent. Texas	West Texas	North La.-Ark.	Total Week Ended Nov. 29
Plants Reporting	12	29	25	15	12	93
Da. Av. Cap. (Bbls.)	92,000	160,200	86,600	81,500	54,900	475,200
Da. Cracking Capacity	30,700	52,600	17,200	5,000	22,700	128,200
Da. Av. Crude Runs	57,097 — 2.6	109,620 — 7.8	63,118 — 5.3	30,515 — 11.0	54,723 — 0.1	315,073 — 5.4
Da. Av. Other Oils	6,026 — 33.7	5,482 + 46.8	1,494 — 23.1	2,295 — 12.7	2,754 + 2.9	18,051 — 10.1
GASOLINE—Gallons						
Stocks, Nov. 22	16,475,000	48,328,000	15,963,000	12,292,000	7,710,000	100,768,000
Prod. 11-22 to 11-29	8,805,000 — 13.3	17,901,000 — 6.3	8,809,000 — 0.1	3,103,000 — 12.8	5,173,000 — 3.6	43,791,000 — 6.8
Ship. 11-22 to 11-29	8,167,000 — 6.4	15,579,000 — 15.1	8,315,000 — 0.7	2,917,000 — 9.2	4,576,000 — 23.0	39,554,000 —11.3
Stocks, Nov. 29	17,113,000 + 3.9	50,650,000 + 4.8	16,457,000 + 3.1	12,478,000 + 1.5	8,307,000 + 7.7	105,005,000 + 4.2
Ratio Sales to Prod.	92.8%	87.0%	94.4%	94.0%	88.5%	90.3%
KEROSENE—Gallons						
Stocks, Nov. 22	13,571,000	8,417,000	2,329,000	31,000	1,323,000	25,671,000
Prod. 11-22 to 11-29	1,747,000 — 6.9	2,261,000 — 7.4	1,748,000 — 3.5	.....	401,000 — 4.1	6,157,000 — 6.1
Ship. 11-22 to 11-29	1,162,000 + 39.8	2,220,000 + 18.9	1,732,000 + 1.5	.....	300,000 — 41.4	5,414,000 + 9.8
Stocks, Nov. 29	14,156,000 + 4.3	8,458,000 + 0.5	2,345,000 + 0.7	31,000	1,424,000 + 7.6	26,414,000 + 2.9
Ratio Sales to Prod.	66.5%	98.2%	99.1%	.....	74.8%	87.9%
STOVE DISTILLATE—Gallons						
Stocks, Nov. 22	2,753,000	5,645,000	1,634,000	228,000	327,000	10,587,000
Prod. 11-22 to 11-29	554,000 — 22.4	1,012,000 + 2.0	337,000 + 39.8	99,000 — 18.2	166,000 — 17.8	2,168,000 — 4.5
Ship. 11-22 to 11-29	523,000 — 21.4	1,208,000 + 5.9	518,000 + 40.4	40,000 — 59.2	404,000 + 99.0	2,693,000 + 8.8
Stocks, Nov. 29	2,784,000 + 1.1	5,449,000 — 3.5	1,453,000 — 11.1	287,000 + 25.9	89,000 — 72.8	10,062,000 — 5.0
Ratio Sales to Prod.	94.4%	119.4%	153.7%	40.4%	243.4%	124.2%
GAS OIL—Gallons						
Stocks, Nov. 22	2,712,000	38,712,000	2,264,000	12,640,000	5,313,000	61,641,000
Prod. 11-22 to 11-29	1,279,000 — 18.0	2,264,000 + 29.4	726,000 + 81.0	—646,000	2,299,000 + 7.9	5,922,000 — 11.5
Ship. 11-22 to 11-29	782,000 — 70.6	1,693,000 + 46.7	552,000 — 28.6	973,000 — 58.2	2,984,000 + 54.9	6,984,000 — 21.8
Stocks, Nov. 29	3,209,000 + 18.3	39,283,000 + 1.5	2,438,000 + 7.7	11,021,000 — 12.8	4,628,000 — 12.9	60,579,000 — 1.7
Ratio Sales to Prod.	61.1%	74.8%	76.0%	....	129.8%	117.9%
FUEL OIL—Gallons						
Stocks, Nov. 22	13,293,000	40,347,000	68,286,000	26,395,000	21,960,000	170,281,000
Prod. 11-22 to 11-29	4,952,000 + 2.3	6,344,000 — 18.9	7,744,000 — 10.1	4,521,000 — 10.3	5,543,000 — 9.0	29,104,000 —10.2
Ship. 11-22 to 11-29	5,013,000 — 1.2	8,313,000 — 5.1	7,323,000 — 11.5	5,927,000 — 3.4	5,917,000 — 4.7	32,493,000 — 5.7
Stocks, Nov. 29	13,232,000 — 0.5	38,378,000 — 4.9	68,707,000 + 0.6	24,989,000 — 5.3	21,586,000 — 1.7	166,892,000 — 2.0
Ratio Sales to Prod.	101.2%	131.0%	94.6%	131.1%	106.7%	111.6%

Gasoline Produced by Various Methods, Week Ended November 29

	Kansas	% of Total	Oklahoma	% of Total	North & Cent. Texas	% of Total	West Texas	% of Total	Louisiana-Arkansas	% of Total	Total	% of Total
Straight Run	5,863,000	66.6	11,721,000	65.5	5,753,000	65.3	2,808,000	90.5	1,571,000	30.4	27,716,000	63.3
Cracked	2,337,000	26.5	5,053,000	28.2	1,861,000	21.1	109,000	3.5	3,077,000	59.5	12,437,000	28.4
Natural	605,000	6.9	1,127,000	6.3	1,195,000	13.6	186,000	6.0	525,000	10.1	3,638,000	8.3
Total	8,805,000		17,901,000		8,809,000		3,103,000		5,173,000		43,791,000	

+ or — columns are % change over previous week.

Cold Wave Lowers Gasoline Shipments

Staff Special—By Telegraph
TULSA, Dec. 2

COLD weather in the middle west the past few days has had its effect on demand for major commodities in the Mid-Continent, judging from weekly operations' reports from 93 refineries reporting to this publication for the last week in November.

Gasoline shipments dropped 5,000,000 gallons. North Texas showed the smallest loss due primarily to the movement of export gasoline.

Crude runs were reduced 18,000 barrels daily average, and gasoline production was lower by 3,200,000 gallons. All districts reported lower crude charges and gasoline production.

Kerosene production was slightly lower and shipments higher. Stocks continued to increase.

Distillates, gas and fuel oils stocks

Summary for the Month

Production and shipments, all reporting refineries, for four weeks ended Nov. 29. Change in stocks figures from Nov. 1.

GASOLINE

	Gallons
Production	185,973,000
Shipments	175,578,000
Net change in stocks	+10,395,000
Ratio sales to production	94.4%

KEROSENE

	Gallons
Production	26,397,000
Shipments	20,824,000
Net change in stocks	+5,573,000
Ratio sales to production	78.9%

STOVE DISTILLATE

	Gallons
Production	8,659,000
Shipments	9,324,000
Net change in stocks	—665,000
Ratio sales to production	107.7%

GAS OIL

	Gallons
Production	26,464,000
Shipments	30,828,000
Net change in stocks	—4,364,000
Ratio sales to production	116.5%

FUEL OIL

	Gallons
Production	129,157,000
Shipments	137,516,000
Net change in stocks	—8,359,000
Ratio sales to production	106.5%

were reduced. Distillate shipments increased 200,000 gallons and stocks were reduced 500,000 gallons. Gas oil stocks were lowered by 1,100,000 gallons and fuel oil stocks by 3,300,000 gallons.

To Discuss One-Stops At Nebraska Meet

CLEVELAND, Nov. 30.—One-stop stations, the code of marketing practices, gasoline inspection and other subjects of current interest to jobbers will be discussed at the ninth annual meeting of the Nebraska Independent Oil Mens Association at Omaha, Dec. 11 to 13, according to the announcement of C. M. Sutherland, secretary.

One session at the meeting is to be given over to good roads. The secretary of the Nebraska Good Roads Association will give an illustrated report on the organization's plans. Roy Cochran, state engineer, will report on the state's paving plans.

The code discussion will be held on the afternoon of Dec. 12. Several speakers are to be heard on that subject.

"Gasoline Inspection—A Necessity or a Nuisance," will be the subject of an address by W. A. McAtee, president of the North American Gasoline Tax Conference. The Nebraska inspector, O. V. McCracken, will speak also.

Super service at one-stop stations will be discussed by several speakers at one session. Other merchandising talks will include, "Some Jobbers I Have Seen," by a division superintendent of one of the major companies; "Our Changing Times," by Frank D. Thompson of the Woods Brothers Co.; and "A Dissertation on Filling Stations I have Seen," by C. W. Mottor, president of the Lincoln As Club.

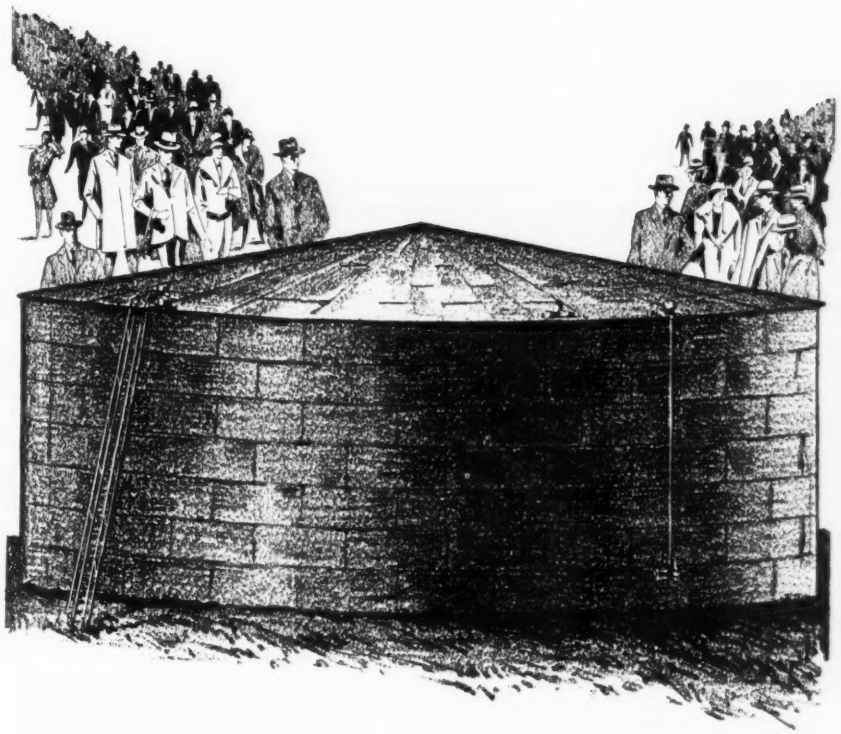
Special reduced fares have been granted by the railroads on the certificate plan.

Mid-Continent Plans To Market Ethyl

TULSA, Nov. 30.—The Mid-Continent Petroleum Corp. has obtained a license to blend and distribute Ethyl gasoline. Early in December it will make formal announcement of that fact through newspaper and magazine advertisements in the territory in which it markets its refinery products.

The Ethyl fluid will be blended with the Mid-Continent's NeverNox gasoline, and will be known as "NeverNox Ethyl" gasoline. The NeverNox gasoline has been distributed for the past two or more years as an anti-knock gasoline, which was sold through retail stations at a premium.

Are Your Stockholders Protected?



OIL in storage represents a substantial part of your stockholders' assets.

To completely equip a tank with Oceco Gauge and Thief Hatches, Conservation Vent Units and other necessary fittings, costs but a small fraction of 1% of the value of tank and contents.

Make sure that your stockholders receive the protection to which they are entitled by having your tanks Oceco equipped. The cost is little and the protection great.

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National advertising helps you take more pride in your job — helps you make more frequent turnovers.

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as the Extra Service **MOTOR OIL**

Refinery - Tank Wagon Markets

National Petroleum News

Mid-Continent Fuel Oils Tighten Up; Gasoline Demand Slackens

Staff Special
TULSA, Nov. 30.

GASOLINE demand was comparatively light in all districts of the Mid-Continent the last week of November. Prices of lower gravities lost some ground but no general change in prices for the higher gravities was noted.

Mid-Continent price ranges for fuel oils narrowed slightly due to less goods being available at the lows of the ranges of a week ago. Fuel oil in several districts was scarce for prompt shipment. Gas oils and distillate were in better demand at slightly higher prices.

Natural gasolines were not as tight for prompt shipment, although grades A and AA were still in excellent position.

No change was checked in bright stock, neutral oils and wax. Kerosene was featureless and prices were virtually nominal in all districts.

Gasolines

Refiners in the Mid-Continent area reported the amount of gasoline business transacted was relatively small. Weather conditions were unfavorable and the holiday also was a factor in the decrease in the volume of goods moved.

A majority of spot sales moved within the price ranges established the previous week. Marketers continued to influence the market somewhat by low prices on goods sold from other areas on a group 3 basis.

A few reports were heard that Oklahoma gasoline sold at 6.50 cents, but no sales of 58-60 U. S. Motor at this price could be checked as having moved direct to jobbers. Odd cars continued to be offered from outside districts on a group 3 basis at 6.50 cents.

Demand for high gravity gasolines was steady. No surplus goods appeared in the open market. The increase in movement of these grades which normally occurs at this time of the year kept most of the refiners well sold up. Very few refiners had 68-70, 350-360 e.p. gasoline to offer.

Natural Gasolines

The tightness which had prevailed in the natural gasoline market showed signs of loosening some at the beginning of the week. There was a reluctance to buy heavily for December delivery. Buying was sufficient, however, to keep grades A and AA in a good position with goods relatively scarce. The B and BB grades were more freely offered. Grade C price was in line with the price of grade BB.

Several manufacturers have reported that the demand for grades A and AA the later part of November was so near the total production of these grades that goods were extremely scarce. Several marketers were known to have been caught short. One or two companies reported they had broken all previous records in volume of goods handled.

The tightness of the higher grades permitted at least one large manufacturer to sell his production and buy his inter-company requirements of grades BB and C on the outside and stabilize that spot in the market.

Fuel Oils

The general range for Mid-Continent fuel oil narrowed as prices advanced 2.50 to 5 cents. Sellers who formerly sold at the lows of the price ranges prevailing at the first of the week were either sold up or quoting higher prices at the close of the month. Scarcity of goods in Oklahoma forced buyers, who had looked to this market for their supplies in the past, into other districts and a better movement was reported from all quarters.

Fuel oil in Kansas was scarcer than it had been previously this year, a number of refiners reported.

Distillates and Gas Oil

Colder weather in the large consuming districts caused a steady demand for distillates although the buying was in small lots and not sufficient to influence prices to any extent. Goods still were plentiful with marketers anxious to move stuff they had been holding for several weeks. Several refiners who had little goods to offer advanced quotations on 38-40 straw distillate to 4 cents, while others offered this grade freely at 3.75 cents. Odd cars were available under the lower figure but in most instances the goods were of bad odor or high flash.

Gas oils were generally unchanged in demand although sellers who sold at the lows of the previous week's price ranges had little goods to offer, with the result that bulk of goods moved at slightly higher prices.

Kerosene

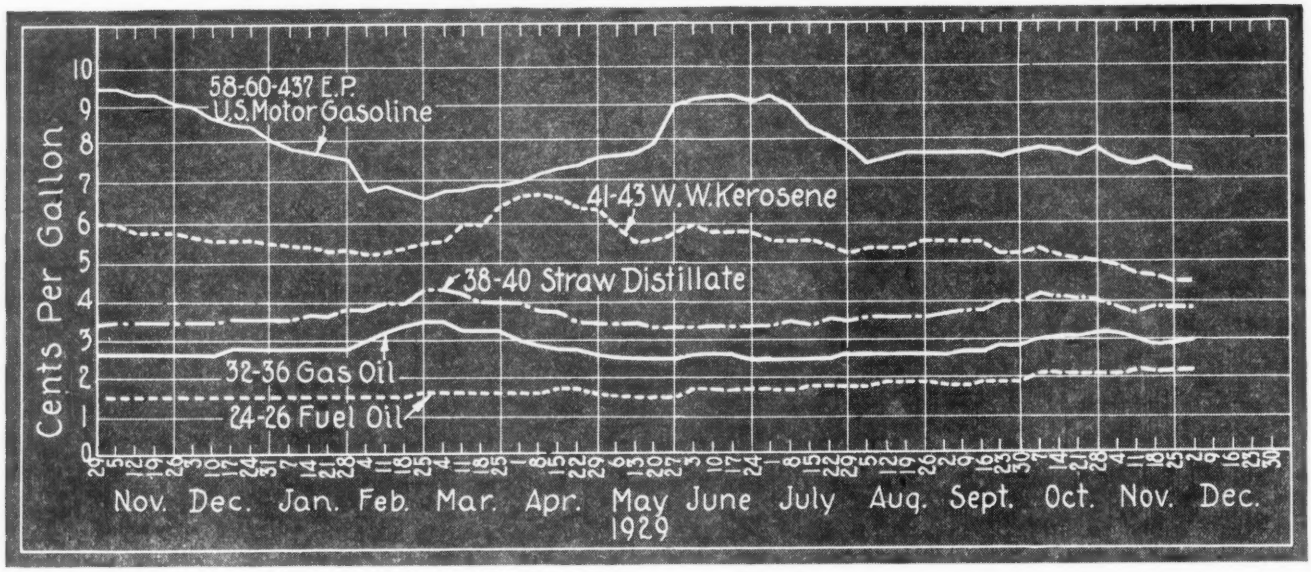
No buying of kerosene of importance was noted. Goods sold at lower prices in the Kansas and north Texas districts. Prices were virtually nominal in all districts, as movement in the spot market was extremely light.

Bright Stock, Neutral, Wax

No change was reported in quotations on bright stock, neutral oils, or wax. The three products were more freely available at last week's prices. One of the larger refiners of bright stock and neutral oils indicated that he would be in a position to offer more goods for spot delivery within a short time.

CHICAGO, Nov. 30.—M. W. Prellberg has resigned from the marketing department of Jas. B. Berry's Sons Co. to be assistant director of sales with the Falley Petroleum Co., 38 S. Dearborn St. Mr. Prellberg has been with the Jas. B. Berry company for about 10 years.

Current Prices of Principal Mid-Continent Refined Products


Cents Per Gallon
58-60-437 E.P. U.S. Motor Gasoline
41-43 W.W. Kerosene
38-40 Straw Distillate
32-36 Gas Oil
24-26 Fuel Oil
Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1929

Prices shown are in Group 3 basis and extended to date shown in Refinery Market Tables Section of this issue

Tennessee Jobbers' Thumbs Down on Discounts

NASHVILLE, Dec. 2.—A resolution having as its goal the ultimate abolition of commercial discounts on gasoline, was introduced and adopted at the tri-annual meeting of the Tennessee Oil Men's Association which was held at the Hotel Peabody at Memphis on Nov. 25.

Condemnation of "courtesy cards" and similar trade practices at variance with the code of marketing ethics was voiced in the resolution, according to L. W. Collins, executive secretary.

A general discussion of the code, methods of handling alleged complaints of violations of its rules, and marketing conditions and practices throughout the state, were the outstanding topics of discussion at the meeting. An open meeting of the state code committee was held to further interpret several rules. This meeting was presided over by W. G. Guzzo, Gulf Refining Co., Knoxville, in the absence of Mark H. Senter, the state chairman. Judge Minor, counsel for the Standard Oil Co. of Louisiana, New Orleans, was the chief speaker on the code of ethics.

"Merchandising Your Wares" was the subject of the address of H. E. Perkins, Tide Water Oil Sales Corp., New York. M. J. Nolan, chief chemist, Producers & Refiners Corp., Tulsa, spoke on the various processes of refining gasoline.

Three other resolutions pertaining to association affairs and the oil industry of the state generally were offered and adopted by the association.

B. E. Holman, president of the Elk Oil Co., Fayetteville, and president of the association, called the meeting to order and introduced new members and guests. Some 75 jobbers and distributors, including five of the seven major companies operating in Tennessee, attended the meeting.

Winter Frolic for Wisconsin Jobbers

MILWAUKEE, Dec. 2.—A winter frolic will be held by the Wisconsin Petroleum Association at the Hotel Pfister, Milwaukee, on Jan. 28 and 29, giving the oil men of the state an opportunity to talk over their problems and plans for 1930, according to Francis H. Casey, Wadhams Oil Corp., Milwaukee.

There will be enough space for 45 equipment manufacturers to exhibit, and well-known speakers have been arranged for the program. Entertainment will also be provided.

CHICAGO, Nov. 30.—Miss Jessie Lucille Harden and Brown L. Meece were married Nov. 14 at Minneapolis. Mr. Meece is assistant general manager of Producers & Refiners Corp., with headquarters at Independence, Kansas.

Shipments From Southern California

LOS ANGELES, November 29.—Bulk petroleum shipments from Southern California ports for week ending November 23 were as follows: (Barrels)

Destination	Crude	Gasoline	Diesel	Distillate	Gas-Oil	Fuel
Pacific For.	123,905	.....	91,033	.....	.....	265,045
Atlantic For.	.....	148,489	.....	.....	9,494	.....
Atlantic Dom.	.....	422,395	.....	94,227	76,378	.....

Prices 10 Years Ago
Dec. 1, 1919

	Oklahoma	Penna.
58-60 U. S. Motor.....	16.00–16.25c	19.50–20.00c
80-84 Natural	22.75–23.00c	.....
Kerosene (41-43 Okla.; 47 w. w. Pa.)	9.50–9.75c	13.25c
Fuel Oil (24-26 Okla.; 38-40 Pa.)	$3.75–$4.00	8.00–8.50c
Crude (Okla. 35-35.9)....	$2.50	$4.50
Chicago tank wagon	.....	21.00c

Prices A Year Ago
Dec. 3, 1928

	Oklahoma	Penna.
58-60 U. S. Motor.....	9.0689c	10.50–11.00c
Grade A Natural	8.875–9.125c	.....
Kerosene (Okla. 41-43; Pa., 47 w. w.)	5.75	8.00–8.25c
Fuel Oil (Okla. 24-26; Pa. 36-40)	$0.625–$0.675	4.75–5.00c
Crude (Okla. 35-35.9)....	$1.31	$3.50
Chicago tank wagon	.....	15.00c

Chicago Resale Market

Burning Oils Active; Gasoline Drops

Staff Special
CHICAGO, Nov. 30

WINTRY weather continued to hold the middle west in its grip and demand for zero burning oils from home burner owners was keeping Chicago distributors extremely busy. On the other hand, the consumption of gasoline was considerably less and several hundred cars of U. S. Motor gasoline were reported offered for reasonably prompt shipment at "bargain" prices.

The bulk of this gasoline was offered by two or three marketers for shipment to many points in Ohio, Michigan and eastern Indiana, where favorable freight rates prevail at reported prices of 9 to 9.50 cents delivered. Some of this U. S. Motor was sold for delivery in Chicago at a reported price of around 8.75 cents delivered. Most of the above goods moved from an Illinois refinery, although some was offered from refineries in Michigan and Indiana.

Many sellers reported that the spot demand for U. S. Motor gasoline, out of the Mid-Continent, was practically non-existant Nov. 29 and 30, due to these low priced sales and also to the inclement weather. Little change was noted in prices of Oklahoma, north and west Texas U. S. Motor. The bulk of sales reported ranged from 6.625 to 7.25 cents on Oklahoma goods and at 6.625 to 6.75 cents, f.o.b. Group 3, on the north and west Texas material. One Chicago jobber said he had been offered full specification U. S. Motor, for shipment out of Oklahoma, at 6.25 cents. On the other hand, many carlot marketers said that 6.50 cents was the lowest price they could get on Mid-Continent U. S. Motor.

Some idea of the general opinion regarding the probable range of prices on gasoline over the next few months was gained from bids for the Chicago post office gasoline business for the first quarter of 1930. This contract calls for approximately 300,000 gallons of U. S. Government Motor gasoline (revised specifications adopted June 11, 1929), goods to be delivered in tank cars and storage to be furnished where government trucks may be filled.

Only three companies made bids on a tank car basis, which were as follows: a flat price of 6.75 cents, f.o.b. Group 3, for the three months' period; average price Chicago Journal Commerce, date of shipment, with a minimum of 6.50 cents and maximum of 7 cents; and average price Chicago Journal Commerce, date of shipment, with a maximum of 7.29 cents. An allowance of 0.50-cent is made for handling. It is not known yet which bid will be accepted.

The demand for higher gravity gasolines was reported considerably better in most quarters. A number of sellers said they sold more 60-62, 400 e.p.; 64-66, 375 e.p. and 68.70, 350-360 e.p. gasolines than they did U. S. Motor. Most of these orders were for delivery into the northwestern portions of Standard of Indiana territory. Prices were generally unchanged, by most sellers, but it was reported harder to obtain goods at the lows of the price range shown on Nov. 30.

Kerosene continued to be practically a "dead issue" in the Chicago market. Little change was noted in prices with the majority of sales of 41-43 w.w. at 4.375 to 4.75 cents. Scattered sales were reported at 4.25 cents, but sellers stated that whenever they could locate a buyer they had no trouble in getting at least 4.375 cents.

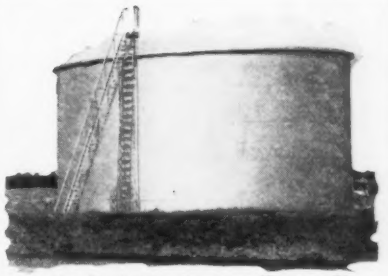
Distributors of home burner oils, via tank wagon, almost without exception reported a heavy business this week with orders coming in thick and fast. However, as many of them reported their storage was still well filled it was apparent that this demand would have to hold up for a time to bring much activity to the tank car market.

While several carlot marketers and refiners reported a better demand for distillates, zero gas and fuel oils, most of them said they did not expect an active market until about the middle of next week. Tank car prices on these products were generally unchanged.

Cold weather is likely first half of next week in the Standard of Indiana territory, followed by rising temperatures, says the Chicago weather bureau. Occasional periods of precipitation in form of rain or snow are likely.

G. B. Williams Joins Transcontinental

CHICAGO, Nov. 30.—George B. Williams, recently resigned as sales manager of the Johnson Oil Refining Co., Chicago, will be Chicago division manager of the Transcontinental Oil Co., 122 S. Michigan avenue. Mr. Williams' experience as an oil man dates back to 1918 when he entered the employ of the Johnson company.



50 Ft. Marketing Tank at Tampa, Fla.

Marketing Tanks That Stop Evaporation

Practically no evaporation takes place from marketing tanks that are equipped with Wiggins Roofs. You can hold gasoline for better prices in them without having evaporation loss cut down your chance to make a profit.

Whenever installing storage of 25,000 gallons or over, ask for our quotation on field erected tanks completely equipped with Wiggins Roofs.

Chicago Bridge & Iron Works

Chicago	2125 Old Colony Bldg.
New York	3145 Hudson Terminal Bldg.
Cleveland	2206 Union Trust Bldg.
Boston	1516 Consolidated Gas Bldg.
Philadelphia	1614 Jefferson Bldg.
Dallas	3339 Magnolia Bldg.
Atlanta	1050 Healey Bldg.
San Francisco	1060 Rialto Bldg.

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SUPERIOR OILS

are not something to put aside like a straw hat in the fall or a fur coat in the spring. They are always in demand and made with specifications to fit the season.

GASOLINE
KEROSENE
FUEL OIL
CYLINDER OIL
NEUTRALS
BRIGHT STOCK

W Y W
H O E
A U H
T A
E N V
V E E
E E I
R D T.

SUPERIOR OIL WORKS
Warren
Pennsylvania

Comparative Prices of 58-60 U. S. Motor Gasoline, 437 E. P., Group 3 and Point of Origin, to Jobbers Only

In Effect December 2

	Price F.O.B. Group 3		*Price F.O.B. Point of Origin*		*If for Particular Destination*
Oklahoma	7.2219	(Wt. Avg.)	7.2219	(Wt. Avg.)	
Kansas	7.00–7.25				S. O. Neb. & Indiana Territory, etc.
Kansas			No sales reported	(Wt. Avg.)	Kansas only.
North Texas	6.75–7.00		6.625–6.875		
West Texas	6.75–7.00		6.50–6.75		
Louisiana-Arkansas	7.00–7.25				Michigan, Ohio and Indiana.
Louisiana-Arkansas			7.25		State or differential haul.
Indiana-Illinois	6.875–7.25		*		S. O. Indiana territory except Detroit and vicinity. For Ohio on delivered basis only.

*Shipments made from E. Chicago, Ind., and Wood River, Ill., according to conditions and freight rates; no prices F.O.B. point of origin can be given.

Chicago Resale Market

(F. o. b. Group 3, altho goods may originate elsewhere)

CHICAGO, Dec. 2. DISTRESS gasoline appeared in rather large volume in the Chicago market last week. Refiners and resale agents reported sales of Oklahoma U. S. Motor at prices ranging from 6.625 to 7.25 cents. The maximum price on goods moving from other districts of the Mid-Continent was 6.75 cents, group 3 basis. Goods reported sold from Michigan, Indiana and Illinois refineries at 6 cents and less, on group 3 basis, but sales could not be confirmed.

Following prices represent sales of Dec. 2 made on group 3 freight basis, although goods may originate elsewhere:

	Prices Dec. 2	Prices Nov. 25	Prices Nov. 18
58-60 U.S. Motor, 437 e.p.	6.625– 7.25	6.75 – 7.25	6.75 – 7.25
60-62 437 e.p. gasoline	6.875– 7.50	6.875– 7.50	7.00 – 7.50
60-62 400 e.p. gasoline	7.375– 7.75	7.375– 7.75	7.375– 7.75
64-66 375 e.p. gasoline	7.875– 8.125	7.875– 8.125	7.875– 8.125
41-43 w.w. kerosene	4.375– 4.75	4.375– 4.75	4.50 – 4.75
38-40 straw distillate	3.75 – 4.00	3.75 – 3.875	3.75 – 4.00
32-36 ordinary dark gas oil	2.875– 3.00	2.875– 3.00	2.875– 3.00
32-36 dark zero gas oil	3.00 – 3.25	3.00 – 3.25	3.00 – 3.25
32-36 straw zero gas oil	3.125– 3.375	3.125– 3.375	3.125– 3.375
28-30 zero fuel oil	$1.15 –$1.20	$1.15 –$1.20	$1.125–$1.20
28-30 fuel oil	$1.05 –$1.10	$1.05 –$1.10	$1.025–$1.075
24-26 fuel oil	$0.85 –$0.875	$0.85 –$0.875	$0.85 –$0.875
18-22 fuel oil, low sulfur	$0.65 –$0.675	$0.65 –$0.675	$0.65 –$0.675
18-22 fuel oil, high sulfur zero	$0.675–$0.725	$0.675–$0.725	$0.675–$0.725

Weighted Average Prices

OKLAHOMA

	Dec. 2		Nov. 25		Nov. 18	
	No. of cars	Price	No. of cars	Price	No. of cars	Price
58-60 U. S. Motor, 437 e.p.	98	7.2219	49	7.2500	45	7.4972
60-62 437 e.p. gasoline	4	7.0625	2	7.3750	2	7.6250
60-62 400 e.p. gasoline	8	7.4219	4	7.5000	5	7.7500
64-66 375 e.p. gasoline	No sales reported		2	8.1250	No sales reported	

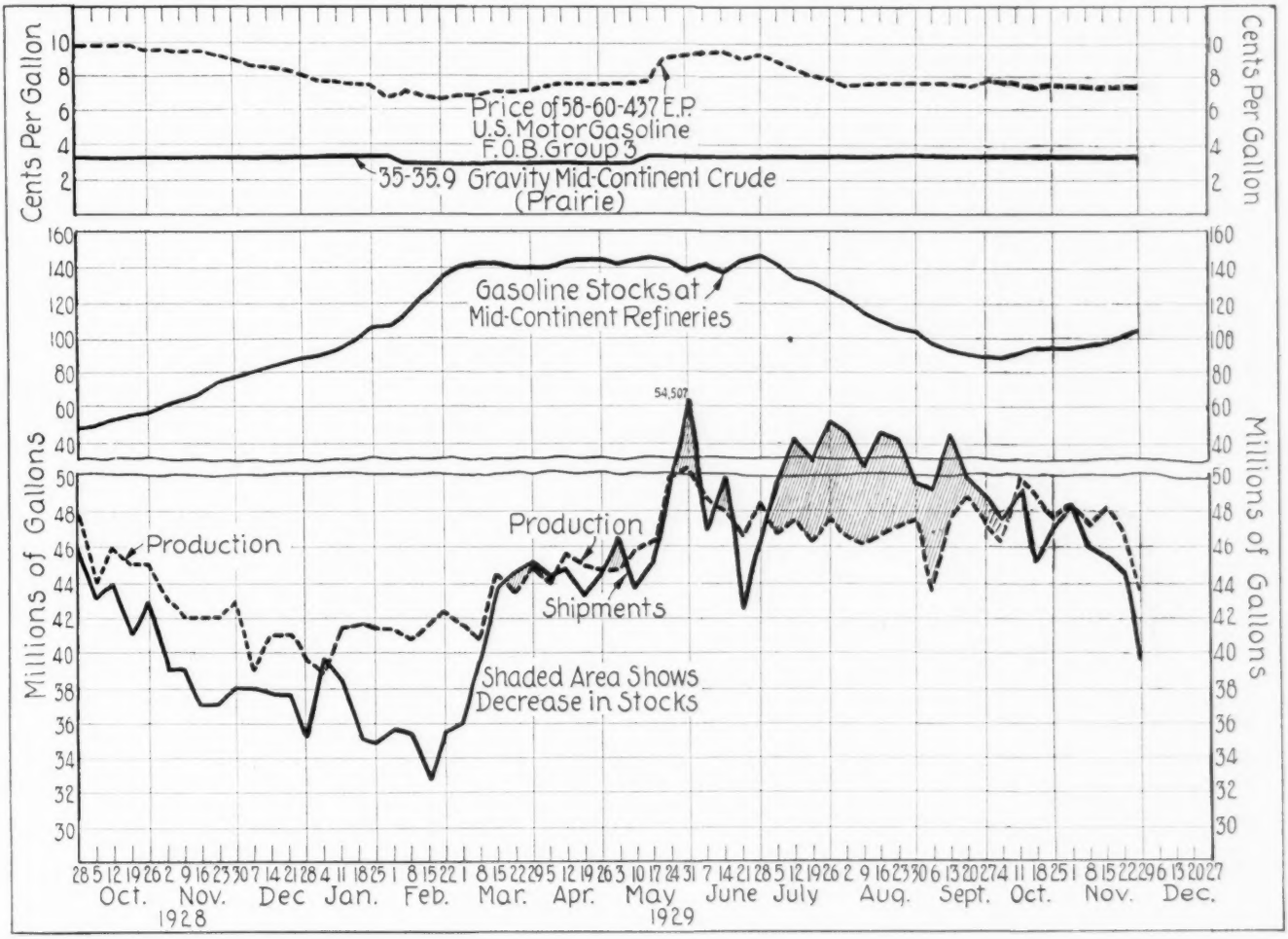
KANSAS

	Dec. 2		Nov. 25		Nov. 18	
	No. of cars	Price	No. of cars	Price	No. of Cars	Price
58-60 U. S. Motor, 437 e.p.	No sales reported		5	7.5000	No sales reported	

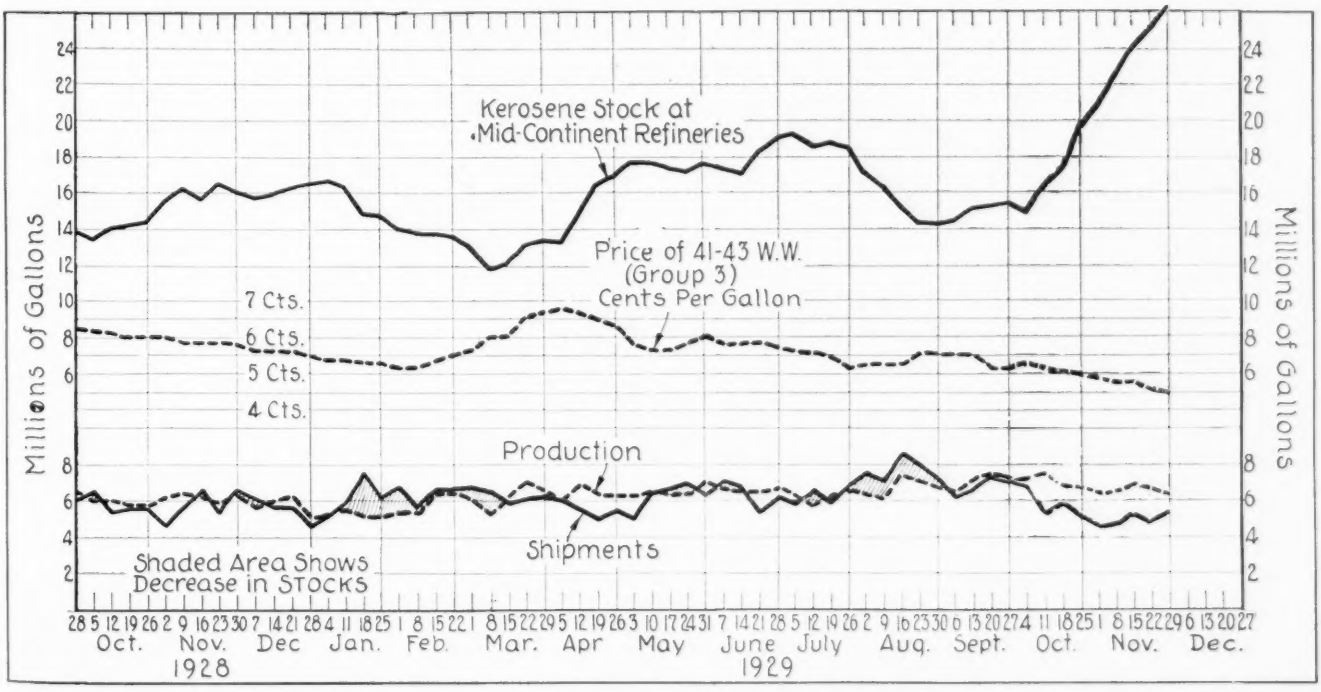
†Prices nominal

Barometer of Mid-Continent Refinery Market—Week Ending November 29

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 93 Plants to National Petroleum News


Cents Per Gallon
Price of 58-60-437 E.P. U.S. Motor Gasoline F.O.B. Group 3
35-35.9 Gravity Mid-Continent Crude (Prairie)
Gasoline Stocks at Mid-Continent Refineries
54,507
Millions of Gallons
Production
Shipments
Shaded Area Shows Decrease in Stocks
Oct. Nov. Dec Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1928
1929

Prices shown above are extended to date shown in Refinery Market and Crude tables in Market section of this issue and stocks, shipments and Production are extended to date as shown in the table on page 122



Refinery Markets on Light Oils and Lubricants

Prices given below are in cents per gallon, F. O. B. refinery except where $ is shown

(These Refinery Prices compiled in the OIL PRICE HANDBOOK for a whole year)

GASOLINE AND NAPHTHA

OKLAHOMA	Prices Dec. 2	Prices Nov. 25	Prices Nov. 18
48-50 450 e.p. naphtha...	6.75 – 7.00	6.75 – 7.00	7.00 – 7.25
50-52 450 e.p. naphtha...	6.75 – 7.00	6.75 – 7.00	7.00 – 7.25
56-58 450 e.p. gasoline...	6.625– 6.75	6.625– 7.00	6.625– 7.00
58-60 450 e.p. gasoline...	6.75 – 6.875	6.75 – 7.00	6.75 – 7.00
64-66 390 e.p. gasoline...	7.50 – 7.625	7.50 – 7.75	7.75 – 8.00
68-70 350-360 e.p. gasoline	8.125– 8.25	8.00 – 8.25	8.00 – 8.375
PENNSYLVANIA			
52-54 Naphtha.....	7.25 – 8.00	7.25 – 8.00	7.50 – 8.25
54-56 Naphtha.....	7.50 – 8.25	7.50 – 8.25	7.75 – 8.00
58-60 U.S. Motor 437 e.p.	8.125– 9.00	8.25 – 9.00	8.25 – 9.00
60-62 400-410 e.p. gasoline	8.50 – 9.25	8.50 – 9.25	8.50 – 9.25
64-66 390 e.p. gasoline....	8.75 – 9.50	8.875– 9.50	9.00 – 9.75
68-70 350-360 e.p.....	10.00 –10.50	10.00 –10.50	10.00 –10.50
OHIO (Quotations of S. O. Ohio. 4c state tax to be added.)			
U. S. Motor Gasoline			
Ohio, delivery at any point.....	10.00	10.00	10.00
KANSAS (F. O. B. refinery Kansas destination)			
60-62 400 e.p. gasoline...	7.50 – 7.75	7.75	7.75 – 8.00
64-66 375 e.p. gasoline...	7.75 – 8.00	8.00	8.00 – 8.25
NORTH TEXAS			
56-58 450 e.p. gasoline...	6.50 – 6.625	6.50 – 6.625	6.625
58-60 450 e.p. gasoline...	6.50 – 6.75	6.625– 6.75	6.625– 6.75
58-60 U.S. Motor 437 e.p.	6.625– 6.875	6.75 – 7.00	6.875– 7.00
60-62 400 e.p. gasoline...	7.00 – 7.25	7.00 – 7.25	7.00 – 7.25
64-66 390 e.p. gasoline...	7.375– 7.625	7.50 – 7.625	7.625– 7.875
64-66 375 e.p. gasoline...	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
68-70 350-360 e.p. gasoline	8.00 – 8.25	8.00 – 8.25	8.125– 8.25
****WEST TEXAS (F.o.b. West Texas refinery, for unrestricted shipment)**			
50-52 naphtha.....	6.00	6.00	5.875– 6.125
58-60 437 e.p. gasoline...	6.25 – 6.625	6.375– 6.625	6.50 – 6.75
58-60 U.S. Motor 437 e.p. gasoline.....	6.50 – 6.75	6.625– 6.75	6.75 – 6.875
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
58-60 U.S. Motor gasoline	7.25	7.50	7.50
ARKANSAS (Ark., N. La and Miss. destination)			
58-60 U.S. Motor 437 e.p.	7.25	7.50	7.50
CALIFORNIA (3c tax to be added to California gasoline prices if used in state.)			
54-58 U.S. Motor 437 e.p.	‡9.50 –10.00	‡9.00 –10.00	‡9.00 –10.00
58-61 375-400 e.p. gasoline	10.50 –11.00	10.00 –11.00	10.00 –11.00
42-45 Engine Distillate 445-480 e.p.....	7.50 – 8.00	7.50 – 8.00	7.50 – 8.00

‡For outside state shipment price was 7.25-8.25c on Oct. 21. 7.00-8.00c on Oct. 28 and Nov. 4. 6.50-7.25c on Nov. 11, 18 and 25. 7.00-7.75 on Dec. 2.

NATURAL GASOLINE

(Note: End point of all grades, not over 375 F. Corrosion test adopted Oct. 1, 1927; A.S.T.M. Method D130-27T; doctor test, July 2, 1928.)

OKLAHOMA			
Grade AA, 80-87.9, 90% Recovery.....	6.625	6.75 – 6.875	6.75
Grade A, 72-79.9, 90% Recovery.....	6.75 – 6.875	7.00 – 7.125	6.75 – 7.00
Grade BB, 84-92, 85% Recovery.....	6.125– 6.25	6.25	6.25
Grade B, 76-83.9, 85% Recovery.....	6.125– 6.25	6.25	6.25
Grade C, 80-92, 78% Recovery.....	6.125– 6.25	6.25	6.125– 6.25
NORTH TEXAS (F. o. b. Breckenridge)			
Grade AA, 80-87.9, 90% Recovery.....	6.625	6.875	6.75
Grade A, 72-79.9, 90% Recovery.....	6.75 – 6.875	7.00 – 7.125	6.75 – 7.00
Grade BB, 84-92, 85% Recovery.....	6.125– 6.25	6.25 – 6.375	6.25
Grade B, 76-83.9, 85% Recovery.....	6.125– 6.25	6.25 – 6.375	6.25
Grade C, 80-92, 78% Recovery.....	6.25	6.25 – 6.375	6.125– 6.25

†Prices nominal **††Only one refiner quoting** ***Quotations only**

NORTH LOUISIANA (F. o. b. Monroe District)	Prices Dec. 2	Prices Nov. 25	Prices Nov. 18
Grade AA.....	6.875	†7.125	†7.00
Grade BB.....	†6.50	†6.50	†6.50
Grade C.....	†6.50	†6.50	†6.375
CALIFORNIA			
75-85, 375-390 e.p. blend	8.25 – 8.75	8.00 – 8.50	8.00 – 8.50

BURNING OILS

PENNSYLVANIA			
45 w.w. kerosene.....	6.375– 6.75	6.50 – 7.00	6.75 – 7.00
46 w.w. kerosene.....	6.75 – 7.25	6.75 – 7.25	7.00 – 7.375
47 w.w. kerosene.....	7.00 – 7.50	7.00 – 7.50	7.25 – 7.75
300 mineral seal.....	7.00 – 7.75	7.00 – 7.75	7.00 – 7.75
OKLAHOMA			
41-43 w.w. kerosene.....	4.25 – 4.75	4.25 – 4.75	4.50 – 4.75
42-44 w.w. kerosene.....	4.625– 5.25	4.75 – 5.25	4.875– 5.125
KANSAS (F. O. B. refinery Kansas destination)			
41-43 w.w. kerosene.....	4.75 – 5.00	5.00 – 5.25	5.00 – 5.25
42-44 w.w. kerosene.....	5.00 – 5.50	5.50	5.50 – 5.625
NORTH TEXAS			
40-42 w.w. kerosene.....	4.00 – 4.25	4.00 – 4.25	4.125– 4.25
41-43 w.w. kerosene.....	4.25 – 4.375	4.25 – 4.50	4.375– 4.50
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
41-43 w.w. kerosene.....	5.00 – 5.375	5.00 – 5.50	5.00 – 5.25
42-44 w.w. kerosene.....	5.50	5.50	5.50
ARKANSAS (Ark., N. La. and Miss. destination)			
42-44 w.w. kerosene.....	5.50	5.50	5.50
CALIFORNIA			
38-40 w.w. kerosene.....	5.00 – 6.00	5.00 – 6.00	5.00 – 6.00

NEUTRAL OIL

PENNSYLVANIA			
Vis.		**(Viscosity at 70°F.)**	
200 No. 3 Assoc. Filt.....	24.50 –27.00	24.50 –27.00	27.00
180 No. 3 Assoc. Filt.....	19.50 –23.00	19.50 –23.00	19.50 –23.00
150 No. 3 Assoc. Filt.....	15.50 –18.00	15.50 –18.00	15.50 –18.00
		(Non Viscous)	
34 Grav. 330-340 Flash..	7.25 – 7.75	7.25 – 7.75	7.50

****OKLAHOMA**				
Vis.	**Color**		**(Viscosity at 100°F.)**	
100—No. 2.....		6.00 – 7.00	6.00 – 7.00	6.00 – 7.00
150—No. 3.....		7.50 – 8.00	7.50 – 8.00	7.50 – 8.25
150—No. 4.....		6.75 – 7.50	6.75 – 7.50	6.75 – 7.50
180—No. 3.....		9.00 – 9.50	9.00 – 9.50	9.00 – 9.50
180—No. 4.....		8.75 – 9.00	8.75 – 9.00	8.75 – 9.25
180—No. 5.....		8.50 – 8.75	8.50 – 8.75	8.50 – 9.00
200—No. 3.....		9.75 –10.00	9.75 –10.00	9.75 –10.75
200—No. 4.....		9.00 – 9.75	9.00 – 9.75	9.00 –10.00
200—No. 5.....		9.00 – 9.25	9.00 – 9.25	9.00 – 9.50
220—No. 3.....		12.50 –13.50	12.50 –13.50	12.50 –13.50
220—No. 4.....		12.00 –12.50	12.00 –12.50	12.00 –12.50
220—No. 5.....		11.00 –12.00	11.00 –12.00	11.00 –12.00
240—No. 3.....		13.00 –13.50	13.00 –13.50	13.00 –13.50
240—No. 4.....		12.00 –13.00	12.00 –13.00	12.00 –13.00
240—No. 5.....		11.00 –12.50	11.00 –12.50	11.00 –13.00
280—No. 3.....		14.00 –16.00	14.00 –16.00	14.00 –16.00
280—No. 4.....		12.50 –15.00	12.50 –15.00	13.00 –15.00
280—No. 5.....		12.00 –14.00	12.00 –14.00	12.00 –14.00

****Represents Both Sales and Quotations.**

Refinery Markets Wax, Lubricants, Heavy Oil

Prices given below are in cents per gallon, F. O. B. refinery except where $ is shown

(For quick reference to Refinery Prices, get the OIL PRICE HANDBOOK, published annually)

GULF COASTAL

Vis.	Color	Prices Dec. 2	Prices Nov. 25	Prices Nov. 18
		(Viscosity at 100°F., pour test 0)		
100	No. 2 Pale	6.00 – 7.00	6.00 – 7.00	6.00 – 7.00
200	No. 3 Pale	9.00 – 9.50	9.00 – 9.50	9.00 – 9.50
300	No. 3 Pale	10.00 –10.75	10.00 –10.75	10.00 –10.75
500	No. 3½ Pale	11.50 –12.00	11.50 –12.00	11.50 –12.00
750	No. 4 Pale	12.50 –13.00	12.50 –13.00	12.50 –13.00
200	No. 5½ Red Oil	8.00 – 8.75	8.00 – 8.75	8.00 – 8.75
300	No. 5½ Red Oil	9.00 –10.00	9.00 –10.00	9.00 –10.00
500	No. 6 Red Oil	9.50 –10.00	9.50 –10.00	9.50 –10.00
750	No. 6 Red Oil	11.50 –12.00	11.50 –12.00	11.50 –12.00

CALIFORNIA

Vis.	Color			
		(Viscosity at 100°F.)		
100	No. 3	9.50 –10.00	9.50 –10.00	9.50 –10.00
200	No. 3	11.50	11.50	11.50
300	No. 3	13.00	13.00	13.00
450	No. 3	15.50	15.50	15.50
550	No. 3	16.50	16.50	16.50
600	No. 3	17.00	17.00	17.00
200	No. 5	11.00	11.00	11.00
300	No. 5	12.00	12.00	12.00
400	No. 5	14.00	14.00	14.00
500	No. 5	15.00	15.00	15.00
600	No. 5	16.00	16.00	16.00
700	No. 7	18.00	18.00	18.00

CYLINDER STOCKS

**OKLAHOMA

190-200 Vis. D at 210° Brt. St.	40.00 –42.00	40.00 –42.00	40.00 –42.00
150-160 Vis. D at 210° Brt. St.	36.00 –37.00	37.00	37.00
150-160 Vis. E 210° Brt. St.	33.00 –35.00	33.00 –35.00	33.00 –36.00
600 St. Ref. Olive Green	9.00 –17.00	9.00 –17.00	10.00 –15.00
600 St. Ref. Dark Green	9.00 –11.00	9.00 –11.00	9.00 –12.00
Black Oil	5.00	5.00	5.00

PENNSYLVANIA (A. S. T. M. Tests)

600 Steam Refined, filterable	27.00 –28.00	27.00 –28.00	27.00
650 Steam Refined	30.50 –31.50	31.00 –31.50	32.00
600 Flash	32.50 –34.50	33.00 –34.50	34.50
625 Flash	36.00 –37.00	36.00 –37.00	36.00 –37.00
600 Warren E	32.00 –32.50	32.00 –32.50	32.00 –32.50
600 Oil City E	31.00 –32.00	31.00 –32.00	32.00
600 D Filtered	36.50 –37.00	36.50 –37.00	36.50 –37.00
Cold Test Stock, 40-50 p. p., 140-150 vis. at 210° 540-550 flash, No. 8 color	47.50 –49.00	47.00 –50.00	49.00 –52.00
40-50 p.p., 140-150 vis. at 210°, 540-550 flash, No. 6-6½ color diluted	46.50 –47.00	47.00 –48.00	†49.00

WAX

PENNSYLVANIA (Per pound, New York)

122-124 white crude scale, a.m.p.	3.125– 3.375	3.375– 3.50	3.375– 3.50
124-126 white crude scale, a.m.p.	3.25 – 3.50	3.50	3.50

**OKLAHOMA

124-126 White Crude Scale, a. m. p.	3.00 – 3.125	3.00 – 3.125	3.00 – 3.25

CALIFORNIA

White crude scale, per pound, ton lots, a.m.p.	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50

DISTILLATE, GAS AND FUEL OIL

PENNSYLVANIA (For outside Pittsburgh district)

36-40 fuel oil	4.875– 5.25	5.00 – 5.25	5.00 – 5.25
30-34 fuel oil	4.75 – 5.00	4.75 – 5.00	4.875– 5.00
28-32 fuel oil	4.75 – 5.00	4.75 – 5.00	5.00

†Prices nominal ††Only one refiner quoting *Quotations only

OKLAHOMA

	Prices Dec. 2	Prices Nov. 25	Prices Nov. 18
38-40 straw distillate	3.75 – 4.00	3.75 – 4.00	3.75 – 3.875
36-38 straw distillate	3.75	3.625– 3.75	3.625– 3.75
32-36 straw gas oil	2.875– 3.125	2.875– 3.00	2.875– 3.00
32-36 straw gas oil zero	3.25 – 3.375	3.25 – 3.375	3.25
32-36 dark gas oil	2.875– 3.00	2.75 – 3.00	2.75 – 3.00
32-36 dark gas oil zero	3.125– 3.375	3.125– 3.25	3.00 – 3.25
28-30 zero fuel oil	$1.15 – 1.20	$1.175– 1.20	†$1.175– 1.20
28-30 fuel oil (in bbls.)	$1.05 – 1.10	$1.05 – 1.10	$1.05 – 1.10
26-28 fuel oil (in bbls.)	$0.90 – 1.00	$0.90 – 1.00	†$0.925– 1.00
24-26 fuel oil (in bbls.)	$0.85 – 0.95	$0.875– 0.975	†$0.85 – 0.95
22-26 fuel oil (in bbls.)	$0.80 – 0.90	$0.775– 0.85	$0.775– 0.825
18-22 fuel oil (in bbls.)	$0.70 – 0.775	$0.675– 0.75	$0.675– 0.725
‡16-20 fuel oil (in bbls.)	$0.65 – 0.75	$0.65 – 0.75	$0.60 – 0.70
14-16 fuel oil (in bbls.)	$0.65 – 0.75	$0.65 – 0.75	$0.60 – 0.70

‡Gravity changed from 16-18 to 16-20, Aug. 19.

KANSAS (F. O. B. refinery Kansas destination)

38-40 straw distillate	4.00 – 4.25	4.00 – 4.25	4.00 – 4.25
36-38 straw distillate	4.00	3.875– 4.00	4.00
32-36 straw gas oil	3.125– 3.50	3.125– 3.375	3.125– 3.25
18-22 fuel oil	$0.75 – 0.80	$0.725– 0.775	$0.70 – 0.75
10-14 fuel oil	$0.725– 0.75	$0.70 – 0.75	$0.65 – 0.70

NORTH TEXAS

38-40 straw distillate	3.75	3.625– 3.75	3.75 – 4.00
38-40 p.w.treated distillate	3.75 – 4.00	3.75 – 4.00	
32-36 gas oil, cracked	2.875– 3.00	2.875– 3.00	2.75 – 3.00
32-36 St. reduced gas oil	2.50 – 2.75	2.625– 2.75	2.625– 2.75
24-26 fuel oil (in bbls.)	$0.725– 0.75	$0.675– 0.725	$0.675– 0.725
20-24 fuel oil	$0.60 – 0.675	$0.60 – 0.65	$0.575– 0.65
18-22 fuel oil	$0.575– 0.65	$0.55 – 0.65	$0.55 – 0.65

**WEST TEXAS (F. o. b. West Texas refinery, for unrestricted shipment)

34-38 gas oil	2.625– 2.75	2.75	2.75 – 3.00
30-32 gas oil	2.50 – 2.75	2.625– 2.75	2.50 – 2.75
28-30 zero gas oil	2.50 – 2.875	2.75 – 3.00	3.00 – 3.25
18-22 fuel oil	$0.525– 0.65	$0.525– 0.60	$0.55 – 0.65

NORTH LOUISIANA (N. La., Ark. and Miss. destination)

32-36 gas oil, dark	3.50	3.25 – 3.50	3.25 – 3.50
32-36 gas oil, straw	3.50	3.25 – 3.50	3.25 – 3.50
14-16 fuel oil (in bbls.)	$0.75 – 0.85	$0.75 – 0.825	$0.75 – 0.825

ARKANSAS (Ark., N. La. and Miss. destination)

32-36 gas oil, straw	3.25 – 3.50	3.25 – 3.50	3.25 – 3.50
32-36 dark gas oil	3.25 – 3.50	3.25 – 3.50	3.25 – 3.50
28-30 gas oil	3.25	3.00 – 3.25	3.00 – 3.25
14-16 fuel oil	$0.75 – 0.85	$0.675– 0.80	$0.75 – 0.825

CALIFORNIA (F. o. b. San Joaquin Valley. At San Francisco 4c per bbl. more)

14-18 fuel oil (per bbl.)	$0.45 –$0.60	$0.45 –$0.65	$0.40 –$0.60
14-18 Bunker oil (per bbl.)	$0.70 –$0.75	$0.70 –$0.75	$0.70 –$0.75
30-34 gas oil (per bbl.)	$0.80 –$0.90	$0.80 –$0.90	$0.80 –$0.90
27 Plus Diesel oil (per bbl.)	$0.80 –$0.90	$0.80 –$0.90	$0.80 –$0.90

PETROLATUMS

PENNSYLVANIA (In barrels, carload lots, f. o. b. refinery. In tank cars ½c to ¾c per pound less.) Two refiners quoting.

Snow White	8.7 – 9.00	8.75 – 9.00	8.75 – 9.00
Lily White	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
Cream White	6.75 – 7.00	6.75 – 7.00	6.75 – 7.00
Light Amber	3.75	3.75	3.75
Amber	3.50	3.50	3.50
Red	3.25	3.25	3.25

PETROLEUM COKE

**OKLAHOMA

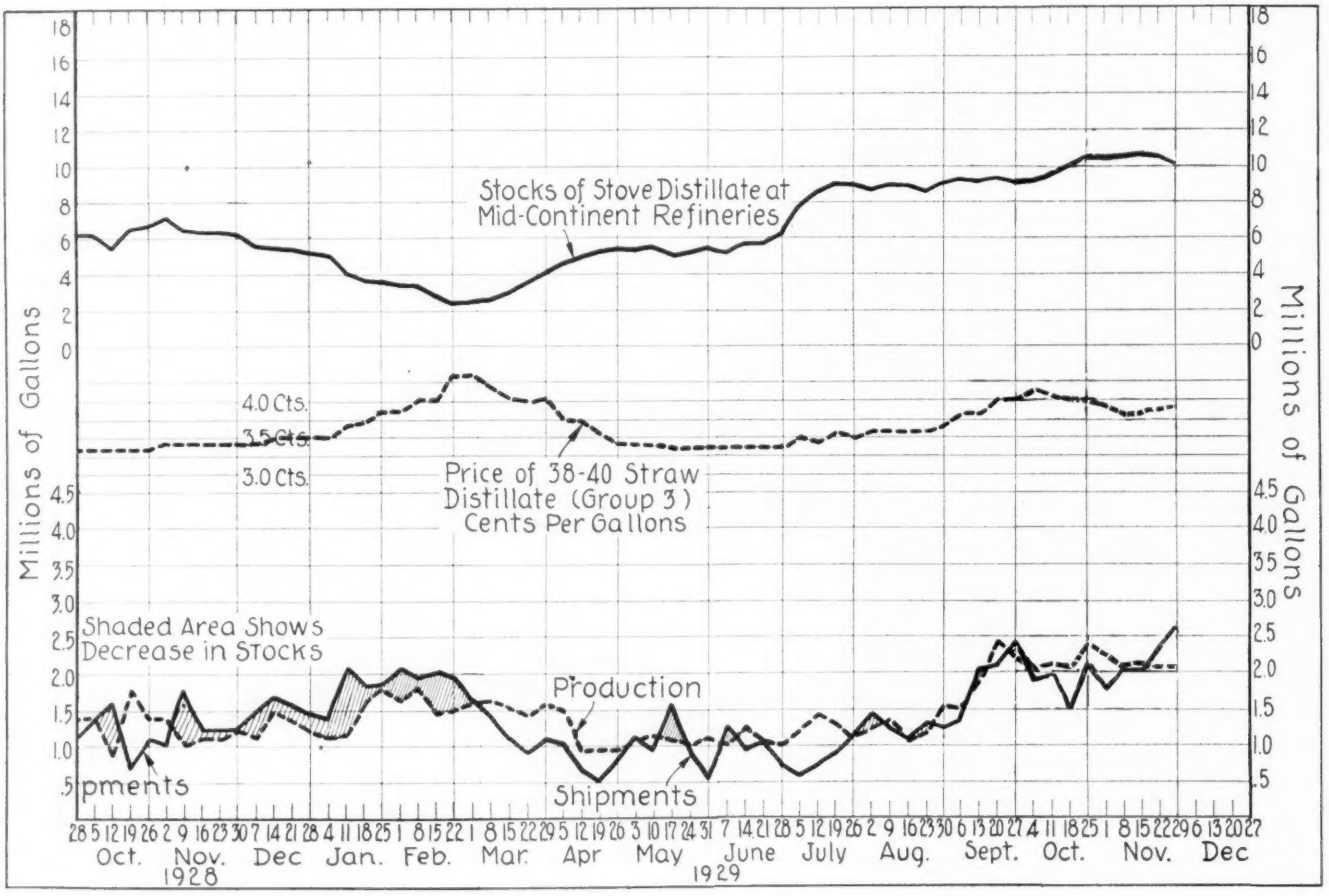
(Per ton in car lots)

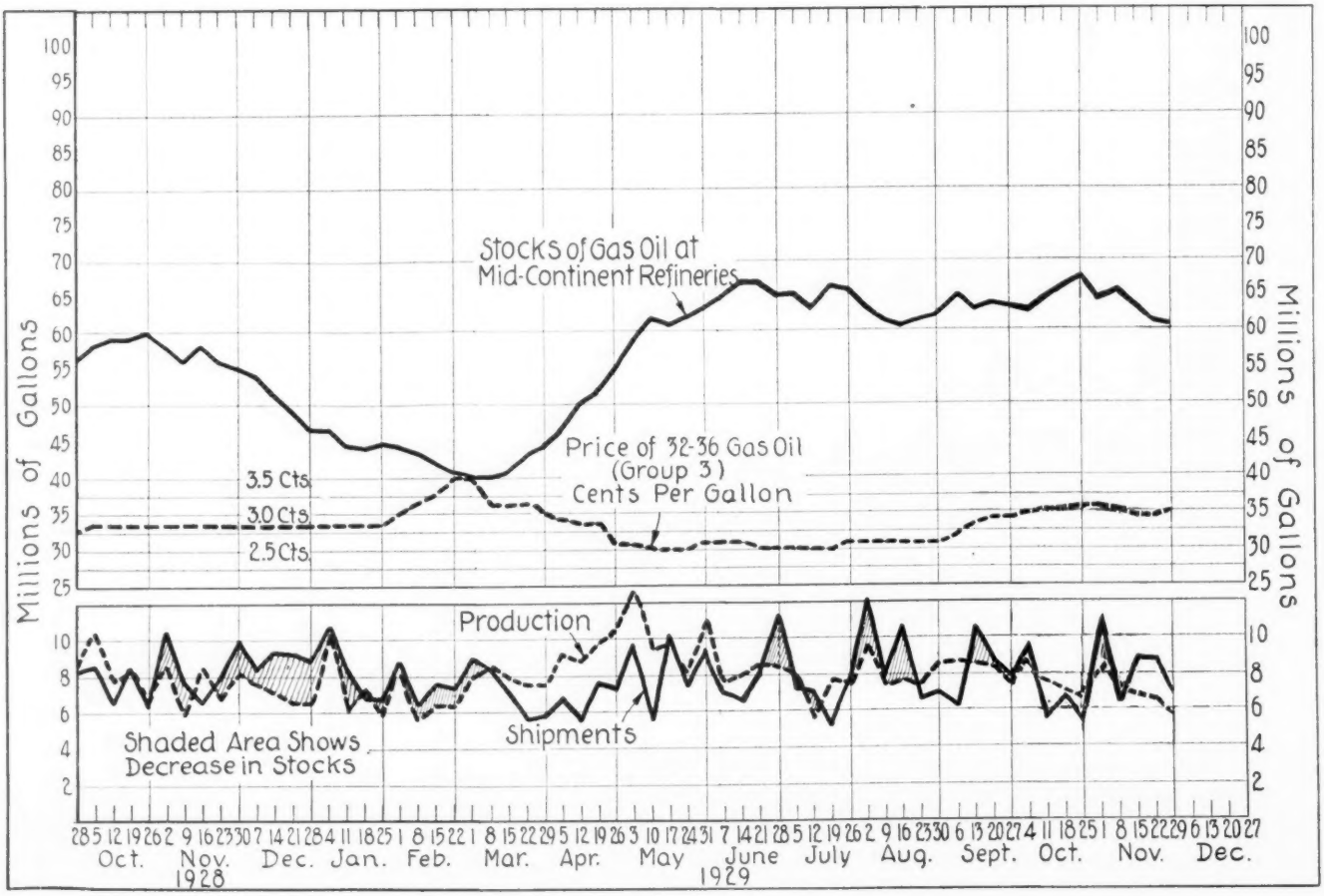
Lump	$4.50 – 5.00	$4.50 – 5.00	$4.50 – 5.00
Still run	$3.00	$3.00	$3.00
Breeze	$2.00	$2.00	$2.00

**Represents Both Sales and Quotations.

Barometer of Mid-Continent Refinery Market—Week Ending November 29

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 93 Plants to National Petroleum News


Millions of Gallons
Millions of Gallons
Stocks of Stove Distillate at Mid-Continent Refineries
4.0 Cts.
3.5 Cts.
3.0 Cts.
Price of 38-40 Straw Distillate (Group 3) Cents Per Gallons
Shaded Area Shows Decrease in Stocks
Production
Shipments
Oct. Nov. Dec Jan. Feb. Mar. Apr May June July Aug. Sept. Oct. Nov. Dec
1928
1929


Millions of Gallons
Millions of Gallons
Stocks of Gas Oil at Mid-Continent Refineries
3.5 Cts.
3.0 Cts.
2.5 Cts.
Price of 32-36 Gas Oil (Group 3) Cents Per Gallon
Production
Shipments
Shaded Area Shows Decrease in Stocks
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1928
1929

You can't settle an argument

WITH A STICK

STICKING a tank doesn't prove anything. It is only the roughest sort of an approximation. It may read anywhere from 3 to 30 gallons off—and who can prove whether it's over or under?

Shortages will continue just as long as you measure gasoline with a stick. So will leaking pipe lines or tanks, inaccurate pumps . . . So will arguments and wasted time . . . *and a constant unnecessary loss which comes from sloppy, antiquated business methods.*

These are plain facts which are already recognized by leading oil companies. It is why several of them are now installing the Liquidometer in all of their service stations—as the most unfailingly accurate device for measuring tank content known today.

These installations have been made only after thorough tests by the oil companies. Liquidometer proves time after time that: it provides an hour-by-hour inventory of stock on hand; enables receipts to be checked accurately against sales; provides an exact check on deliveries; stops arguments when shifts are changed—and, because it shows up the source of leaks and removes suspicion from honest employees, it *greatly reduces labor turnover.*

We strongly urge you to get the facts—just fill out and mail the coupon at the left.

The Liquidometer Corp.
Skillman Ave. and 37th St.
Long Island City, N. Y.

Please send me full information about the Liquidometer.

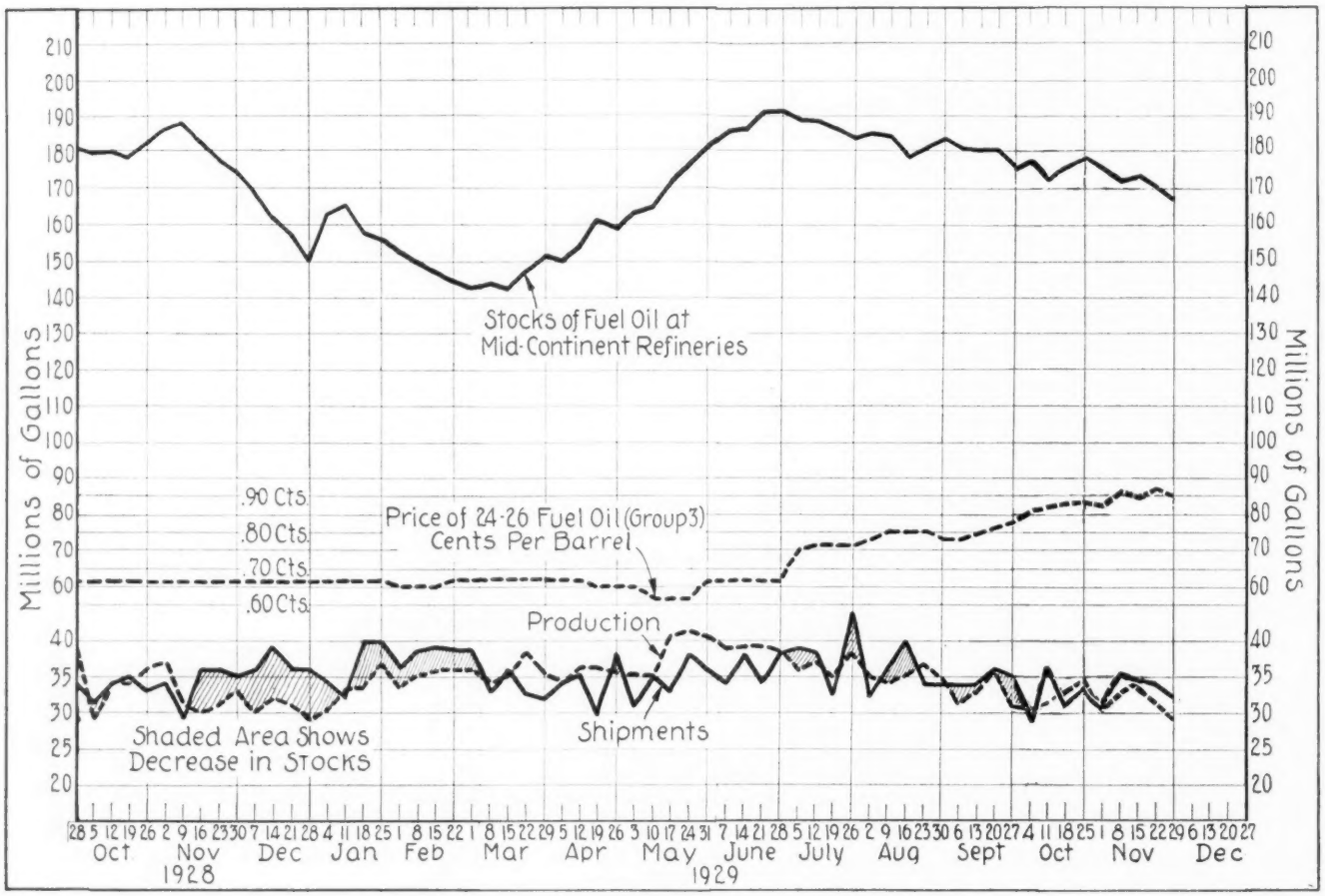
*Name*_____

*Address*_____

_____

Barometer of Mid-Continent Refinery Market—Week Ending November 29

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 93 Plants to National Petroleum News


Millions of Gallons
Millions of Gallons
Stocks of Fuel Oil at Mid-Continent Refineries
.90 Cts.
.80 Cts.
.70 Cts.
.60 Cts.
Price of 24-26 Fuel Oil (Group 3) Cents Per Barrel
Production
Shipments
Shaded Area Shows Decrease in Stocks
Oct Nov Dec Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
1928
1929

California Refinery Market

Optimism Prevails as Prices Move Up

LOS ANGELES, Nov. 29

OPTIMISM prevailed in California marketing circles the past week as a result of active bidding accompanied by actual sales. Quotations for many products showed gains over prices of a week ago and there was every indication that business was on the up grade.

There were a number of refiners who predicted the present buyer's market would soon give way to a new order of things.

Dearth of spot sales in offshore business continued to cast a shadow over the Pacific Coast market to a slight extent. Some independent refiners have about made up their minds to concentrate on local trading rather than attempt to compete in intercoastal shipping.

This reaction on the part of the smaller shipper has taken place to a large extent because of the false impression buyers on the eastern seaboard have of Pacific Coast prices. Where a cargo of gasoline was reported as having been sold recently at 8.50 cents c.i.f. the Atlantic seaboard, the eastern buyer has deducted 25 cents per gallon as the tanker rate and figured that he should be able to buy U. S. Motor on the Pacific Coast at around 6 cents.

The fallacy of this calculation lies in the fact that where gasoline sold at 8.50 cents delivered, the sale was made by large interests who own their own tankers and can operate at about 1.5 cents per gallon.

Buyers during the past week have been offering 6 cents and in some cases 5.75 cents for 437 e.p. gasoline. Local refiners have refused to sell at these low prices with the consequence that intercoastal spot sales have been few and far between.

An English buyer was reported to be seeking a cargo of 400 e.p. gasoline but as he was expecting to buy it for from 8.25 to 8.50 cents a gallon, it was considered unlikely that a deal would go through.

Inquiries from the eastern seaboard for gas-oil gave indications of better business in this commodity within the near future.

Quotations on all products for export remained unchanged from those quoted last week.

Tank car prices for several commodities showed gains of from 0.25 to 0.5 cent and refiners indicated they expected quotations to be higher within the coming week.

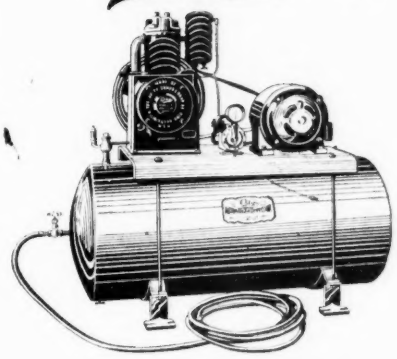
Although several sellers have made contracts for out of state gasoline, business at 7 cents they believe that by the beginning of the new year this figure will be higher. Quotations for this commodity ranged from 7 to 7.75 cents during the past week but the majority of the sales were made at not less than 7.25 cents. It was estimated that approximately three cars of gasoline move out of the state every two days.

Motor fuel to be used within the state was said to be moving at a low of 9.50 cents per gallon but a con-

DOES ALL THE WORK

We suggest you write for particulars of the modern compressor shown below. If you have a hydraulic hoist, air operated gas dispensing or do Paint Spraying—you will have plenty of air for any of these and for all your tire inflating by installing this quick action, foolproof, trouble-proof unit. ASK for Folder KSTU.

The Oro T 58 GOOD as GOLD



Ask your jobber to sell you for **$215**

2 H. P. Motor—60 Gallon Tank

If your jobber does not carry, ask us.

THE AU-TO COMPRESSOR CO.

(20 years of Compressor building)

201 Mulberry St. Wilmington, Ohio

Export office, 126 Liberty St., New York City

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Equipped with Facilities and the Experience of Years for Authoritative

CHEMICAL AND PHYSICAL TESTS on PETROLEUM and ITS PRODUCTS

THE COSMA LABORATORIES CO.

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siderable quantity was known to have been sold for 8.50 cents.

Generally speaking, quotations for gasoline to be used in the state ranged from 9.50 to 10 cents, tax to be added.

Pennsylvania Market

Bright Stock Off 1 to 2 Cents

CLEVELAND, Dec. 2.—Demand for all commodities, except burning oils and neutral oils, slowed up considerably in the western Pennsylvania market during the week ended Nov. 30. Near zero weather brought about a brisk demand for domestic heating oils and while there was no substantial increase in the demand for neutrals, these oils bucked the trend toward general inactivity prevalent in the rest of the market.

Bright stocks were the commodities experiencing the largest changes in prices, but opinion as to the condition of this section of market was greatly at variance.

Quotations for No. 8 color, 40-50 pour test, bright stock from smaller manufacturers and resale agents showed recessions of 1 to 2 cents per gallon over the week. This oil was offered sparingly at 48.50 to 49 cents early in the week but later on it was freely available at 47.50 to 48 cents and there were reports also that the lower figure of this range could be shaded with firm offer.

On the other hand, one of the largest manufacturers of bright stock reported his entire December output of the above grade had been sold at 49 to 50 cents and that about two-thirds of his January and February production also had been sold at these prices. Other large manufacturers also reported being out of the market until Jan. 1.

Dark bright stock, No. 6-6½ color diluted, was offered freely at 46.50 to 47.50 cents on Nov. 30.

Prices for steam refined stocks held their own despite a slightly slower demand for these oils. The minimum quotation for good filterable 600 steam refined remained at 27 cents; at least two large manufacturers of bright stock reported they had paid this price for their December requirements. Reports that 30.50 cents was being shaded to the trade on good 650 stock could not be confirmed; resale agents reported they had been able to buy at this figure, however.

The volume of gasoline buying diminished considerably; the usual number of rumors were heard of low prices being made to the trade but the majority of them lacked confirmation. The low for U. S. Motor remained at 8.25 cents with 60-62, 400-410 end point goods 0.25 cent higher.

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Make the test that has convinced the largest companies in the refining, storage and marketing branches of the industry. Put Key Graphite Paste to the hardest job you can find in sealing lines carrying Gasoline, Kerosene, Hot Oil, High Pressure Steam, Acids, etc., and watch the results. Then you be the judge. Mail the coupon today for a liberal trial supply.

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Key Boiler Equipment Co.
East St. Louis, Ill.

Send me a free test supply of Key Graphite Paste.

Company.....

Address.....

Requested by.....

Eastern Domestic Markets

Cold Weather Retards Gasoline Sales

Staff Special
NEW YORK, Nov. 30

FUEL oils were again the most active commodities in Eastern markets. Prices were unchanged. Gasoline sales were retarded by cold weather but a sufficient volume moved to keep prices at current levels in all districts. Late in the week a reduction in service station prices in western New York State was made by Standard Oil Co. of New York.

Cold but seasonal weather has caused the increase in burning oil consumption, a demand that the trade expects to bring higher prices. Cold weather was reported the last few days of the week in all districts of the northern consuming territory. Price ranges in New England were expected to narrow with the low prices moving upward. Several sellers believed the middle of December would see the elimination of 4.75 cent quotations for gas oil.

The market at New York has failed to react favorably as far as prices were concerned. All sellers have reported good movement of burning oils but none have raised their prices, most of them obtaining 4.75 cents for gas oil and 6 to 6.50 cents for furnace oil.

Some furnace oil business has been done lower than 6 cents, it has been reported, but only in a very few instances. Most sellers were asking them 6 to 6.50 cents and reported business good.

Kerosene also has been benefited by the cold weather although prices at all points were unchanged. One reason they have not shown an increase in price on the east coast, one seller said, is because of the low priced goods available in Pennsylvania. Some kerosene has moved from Pennsylvania in competition with Bayonne, according to this seller, much cheaper than Bayonne refiners could sell it.

Gasoline sales slipped considerably with the advent of severe weather. Demand, however, still remained fair. New York sellers were obtaining 8.75 cents and prices ranged from that to 9 cents flat, down the coast.

Some shading of 8.75 cents was reported at New York, but sales under this figure could not be confirmed. One company at Baltimore has been shading prices of U. S. Motor gasoline but only on goods shipped in competition with Philadelphia where the price is 8.75 to 9 cents. This refiner some weeks ago was shading the price but returned to 9 cents. Later when the price at Philadelphia was reduced he made two prices at Baltimore—one at 8.75 cents for goods shipped in competition with Philadelphia and the other 9 cents where Philadelphia sellers did not enter into the picture. The goods which moves at 8.75 cents, principally in parts of Pennsylvania and southern New Jersey, is very small in volume, this seller said, and was not representative of the market. Some of his contract customers at Baltimore who have been shipping his stuff to their stations in the low priced districts have been given the benefit of the lower quotation.

There have been a few quotations made over December, but as a rule, jobbers have not been anxious to purchase over the month.

The reduction in service station prices by the Standard of New York, made by the Buffalo division and which applies to that city and also to Rochester, came as an effort to discourage price cutting in those districts. The cut brings Rochester and Buffalo, and vicinities, down to 18 cents including tax which is the same as tank wagon prices there.

California gasoline prices were unchanged, suppliers at all points generally were quoting 9 cents. One company at Baltimore was obtaining 9.25 cents on goods moved to points near its terminal. The clean, coastwise tanker market continued at a high level. One company chartered a boat the past week and paid $1.05 per barrel for a single trip. The report has been that few long time charters are being made at these rates. One distributor of California gasoline will have three boats of its own in service in the next few weeks.

Gulf Coast Markets

Foreign Gasoline Stocks Believed Low

Staff Special
NEW YORK, Nov. 30

TWO mixed cargoes totaling approximately 125,000 barrels of gasoline and kerosene were sold to a French buyer by East coast suppliers the past week. Two other French buyers were in the market for part cargoes Saturday. An inquiry reported last week was withdrawn from the market. Prices for all commodities were unchanged.

The two mixed cargoes, one for approximately 75,000 barrels of U. S. Motor, 64-66, 375 end point gasoline, 41-43 prime white and 44 water white kerosene, and the other for 50,000 barrels of the same commodities, were sold early in the week. The buyer was one of the largest of Independent French distributors.

The largest of the two cargoes was business which the buyer made inquiry for last week. It was taken by a leading Independent supplier who is to make shipment from the East coast during the latter half of December or the first half of January.

The second cargo was sold by another Independent to the same account. Inquiry for the goods was not circulated generally through the market; the buyer went direct to the refiner with whom he completed the transaction and it was not general knowledge the business had been placed until the middle of the week. The buyer specified early December loading on the second cargo.

The buyer who last week inquired for a cargo of approximately 40,000 barrels of U. S. Motor and 64-66, 375 end point gasoline, a buyer who has not been in the market for some weeks, was believed to have withdrawn his inquiry Saturday, at least this report was current among the trade.

The inquiry for two part cargoes reported Wednesday was still open late Saturday. Both were from French accounts, one seeking approximately 15,000 barrels of U. S. Motor and the other a similar amount of 64-66, 375 end point gasoline. Both buyers wanted the goods shipped around the first of the year and asked for quotations on a c.i.f. basis.

Some of the trade believed Saturday that these two part cargoes would not result in business. It was pointed out that most gasoline moving for export now has been going out full cargoes at a time and that it is almost impossible to find space for the stuff. A New York broker reported he would make a bid for the business if he could charter the necessary space.

Activity of foreign interests has been taken by some of the trade as an indication that foreign stocks are low.

Prices for export commodities were generally unchanged.

Wax Markets

Holiday Lull Sets In Early

NEW YORK, Nov. 30.—A decline of 0.125 cent on the top range of white crude scale prices marked the only price fluctuation in waxes the past week. Sellers generally reported the market quiet, although some reported inquiries fair for scale and low melting point fully refined goods.

The general range of prices for white crude scale was 3.125 to 3.25 cents, although there was some business transacted below and some quotations above this range.

A dealer reported he was able to buy two cars of white goods at 3.05 cents, New York, for domestic shipment. He had the order in hand and reported the seller was small and very anxious to move the goods. He did not believe the purchase was representative of the general market.

A resale agent who tried to cover on a bid below 3.125 cents for domestic shipment was unable to do so. He was quoted 3.375 cents from two sellers who had sold him some stuff below the market a few weeks ago.

Three cents has been offered for domestic shipment at the Gulf and there was a report of a small sale being placed at this price this week. It was not confirmed however.

Some inquiries were received from the Continent and the United Kingdom for both scale and fully refined waxes. One buyer sought a shipment of 700 tons of white crude scale, it was reported, over a period, but the bid was lower than refiners were willing to accept. A seller said he had received an inquiry for 200 tons of 125-125 A.m.p. fully refined wax from the Continent, part of the goods to move immediately and the remainder over a period. He had not closed the sale up to late Saturday.

Most suppliers look for the holidays to cause a slowing up of wax business. They say it is a seasonal occurence but that after the holidays business picks up.

Gulf Lubes Unchanged

HOUSTON, Nov. 30.—Gulf Coastal lubricant prices were unchanged the past week as compared with the last two weeks. Domestic jobber demand was reported somewhat improved but lacking zest. Anticipated higher prices for the pale and red oils have failed to materialize.

CONNERSVILLE, Ind.—Robert T. Huston, vice president and superintendent of the Connersville Blower Co. here, died suddenly at his home on Nov. 14 due to an acute heart attack.

Mr. Huston had been with the company since 1879.

1879 GOLDEN ANNIVERSARY YEAR 1929

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100% Pennsylvania Motor Oils

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Sell a 100% Pennsylvania Motor Oil—YES—and build up your business with FREEDOM 100% Pennsylvania Motor Oils—made from 460-470 flash Bright Stock (Sharples process) and 100% Pennsylvania Crude high flash Neutrals.

The former is made in the Coraopolis plant, the latter in the Freedom plant, of The FREEDOM Oil Works Company—an organization celebrating its fiftieth year of specialization in the refining of 100% Pennsylvania Crude, its Golden Anniversary of fair dealing.

Deliveries can be made in tank cars, compartment tank cars, barrels, or drums. Write for quotations.

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FREEDOM 100% Pennsylvania Crude high flash Neutrals.

100% Pennsylvania Motor Oils, blended to your own specifications from FREEDOM 460-470 Bright Stock and FREEDOM 100% Pennsylvania Crude high flash Neutrals.

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Established 1879
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FREEDOM

Complete Seaboard Market

(Export Markets for whole year given in OIL PRICE HANDBOOK. Each volume carries refinery, tank wagon, crude and export markets—complete for the whole year)

Eastern Domestic Market

(Prices for tank car lots, f. o. b. refinery or seaboard terminal, representing majority of quotations.)

	Dec. 2	Nov. 25	Nov. 18
U. S. MOTOR GASOLINE			
New York harbor	8.75	8.75	8.75
Portland district	*10.75	*10.75	*10.75
Boston district	*10.25	*10.25	*10.25
Providence district	*10.25	*10.25	*10.25
Philadelphia district	8.75 – 9.00	8.75 – 9.00	8.75 – 9.00
Baltimore district	9.00	9.00	9.00
Norfolk district	9.00	9.00	9.00
Charleston district	9.00	9.00	9.00
Savannah district	9.00	9.00	9.00
Jacksonville district	9.00	9.00	9.00
CALIFORNIA, U. S. MOTOR GASOLINE			
New York harbor	9.00	9.00	9.00
Philadelphia district	9.00	9.00	9.00
Baltimore district	9.00	9.00	9.00
WATER WHITE KEROSENE			
New York harbor	7.75	7.75	7.75
Philadelphia district	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
Baltimore district	7.75	7.75	7.75
GAS OIL: 28-34 Gravity			
New York harbor	4.75	4.75	4.75
Boston district	4.75 – 5.00	4.75 – 5.00	4.75
FURNACE OIL: 36-40 Gravity			
New York harbor	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50
Boston district	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50
GRADE C BUNKER OIL†			
New York harbor	$1.05	$1.05	$1.05
Boston district	$1.05	$1.05	$1.05
DIESEL OIL			
New York harbor	$2.00 –$2.10	$2.00 –$2.10	$2.00 –$2.10
MEDICINAL OILS, RUSSIAN			
.885 890 s.g. 320-330 vis.	$0.82 –$0.97	$0.82 –$0.97	$0.82 –$0.97
.870-875 s.g. 145-155 vis.	$0.74 –$0.89	$0.74 –$0.89	$0.74 – 0.89

Note: Above gasoline prices do not include inspection tax levied in some states
*Minimum delivered. †Lighterage 5c per bbl. additional.

New York Export Market

(Lubricating oils are per gal. in bbls.)

	Dec. 2	Nov. 25	Nov. 18
CYLINDER OILS (Pennsylvania Products)			
Bright stock, dark	53.00 –55.00	53.00 –55.00	54.00 –57.00
600 D filtered	43.00 –45.00	42.00 –45.00	43.00 –46.00
600 Warren E filtered	38.00 –41.00	38.00 –41.00	39.00 –41.00
600 s.r. unfiltered	33.00 –35.00	33.00 –35.00	33.00 –35.00
650 s.r. unfiltered	38.00 –40.00	38.00 –40.00	38.00 –40.00
600 flash, s.r.	40.00 –42.00	40.00 –42.00	40.00 –42.00
630 flash, s.r.	43.00 –46.00	44.00 –46.00	44.00 –46.00
RED ENGINE OILS (Vis. 100°)			
300 vis. No. 6½ color	20.00 –21.00	20.00 –21.00	20.00 –21.00
250 vis. No. 6 color	18.00 –20.00	18.00 –20.00	18.00 –20.00
200 vis. No. 6 color	16.00 –17.00	16.00 –17.00	16.00 –17.00
PALE ENGINE OILS (Vis. 100°)			
230 vis. No. 3¾ color	22.00 –24.00	22.00 –24.00	22.00 –24.00
180 vis. No. 3¼ color	18.00 –20.00	18.00 –20.00	18.00 –20.00
100 vis. No. 2¼ color	16.00	16.00	16.00
MOTOR OILS (Vis. 100°)			
600 vis. No. 7 color	30.00 –32.00	30.00 –32.00	30.00 –32.00
500 vis. No. 6½ color	28.00 –29.00	28.00 –29.00	28.00 –29.00
400 vis. No. 7¼ color	26.00 –27.00	26.00 –27.00	26.00 –27.00
300 vis. No. 6 color	23.00 –24.00	23.00 –24.00	23.00 –24.00
200 vis. No. 6 color	21.00 –22.00	21.00 –22.00	21.00 –22.00
MEDICINAL OILS			
.875-880 s.g.	$0.76 –$0.91	$0.76 –$0.91	$0.76 –$0.91
.860-.865 s.g.	$0.58 –$0.73	$0.58 –$0.73	$0.58 –$0.73
WAXES (In cents per pound, f.a.s. carload lots)			
WHITE CRUDE SCALE (In barrels)			
122-124 A.m.p.	3.125– 3.25	3.125– 3.375	3.25 – 3.50
124-126 A.m.p.	3.125– 3.25	3.125– 3.375	3.25 – 3.50
FULLY REFINED (In burlap bags)			
123-125 A.m.p. Phila.	4.125– 4.25	4.125– 4.25	4.125– 4.25
125-127 A.m.p.	4.25 – 4.375	4.25 – 4.375	4.25 – 4.375
128-130 A.m.p.	4.50 – 4.625	4.50 – 4.625	4.50 – 4.625
130-132 A.m.p.	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25
133-135 A.m.p.	5.75 – 6.00	5.75 – 6.00	5.75 – 6.00
135-137 A.m.p.	6.25 – 6.375	6.25 – 6.375	6.25 – 6.375
YELLOW CRUDE SCALE			
124-126 A.m.p.	3.00 – 3.125	3.00 – 3.125	3.125– 3.25

Gulf Export Market

(Prices are f. o. b. Gulf oil terminals in Texas and Louisiana, shipments of 20,000 bbls. or more unless otherwise noted and for export shipment only).

	Dec. 2	Nov. 25	Nov. 18
GASOLINE			
U. S. Motor	8.50	8.50	8.50
60-62, 400 e.p.	9.50	9.50	9.50
61-63, 390 e.p.	9.75	9.75	9.75
64-66, 375 e.p.	10.00	10.00	10.00
U. S. Motor, cases (cargoes)	$1.85	$1.85	$1.85
64-66, cases (cargoes)	$2.00	$2.00	$2.00
KEROSENE			
44 water white	8.00	8.00	8.00
41-43 prime white	7.00	7.00	7.00
Water white, cases (cargoes)	$1.80	$1.80	$1.80
Prime white, cases (cargoes)	$1.70	$1.70	$1.70
DOMESTIC GAS & BUNKER OILS			
*26-30 translucent gas oil	4.00	4.00	4.00
*30 plus translucent gas oil	4.00 – 4.25	4.00 – 4.25	4.00 – 4.25
Grade C bunker oil	$0.95	$0.95	$0.95
Grade C bunker oil, cargoes	$0.70 –$0.75	$0.70 –$0.75	$0.70 –$0.75

*Less than ½ of 1% sulphur.

MEXICAN CRUDE AND BUNKER OILS (F. O. B. Steamer, Tampico)			
Heavy Panuco crude taxes to be paid	$0.60 –$0.65	$0.60 –$0.65	$0.60 –$0.65
Grade C bunker oil for bunkering purposes, taxes paid	$0.90 –$0.95	$0.90 –$0.95	$0.90 –$0.95
SOUTH TEXAS LUBRICATING OILS, (Viscosity at 100°F. cold test 0. Tanker, f. o. b. Houston)			
100 vis. No. 2 unfiltered pale	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50
200 vis. No. 3 unfiltered pale	8.25 – 9.00	8.25 – 9.00	8.25 – 9.00
300 vis. No. 3 unfiltered pale	9.75 –10.00	9.75 –10.00	9.75 –10.00
500 vis. No. 3½ unfiltered pale	11.25 –11.50	11.25 –11.50	11.25 –11.50
750 vis. No. 4 unfiltered pale	12.50 –13.00	12.50 –13.00	12.50 –13.00
1200 vis. No. 5 unfiltered pale	16.25 –16.50	16.25 –16.50	16.25 –16.50
200 vis. No. 5-6 red oil	7.00 – 8.00	7.00 – 8.00	7.00 – 8.00
300 vis. No. 5-6 red oil	8.00 – 8.50	8.00 – 8.50	8.00 – 8.50
500 vis. No. 5-6 red oil	9.25 –10.00	9.25 –10.00	9.25 –10.00
750 vis. No. 5-6 red oil	11.00 –12.00	11.00 –12.00	11.00 –12.00
1200 vis. No. 5-6 red oil	15.00 –16.00	15.00 –16.00	15.00 –16.00

Gulf Domestic Market

(Prices are f.o.b. Gulf oil terminals in Texas and Louisiana in shipment of 20,000 bbls. or more, representing sellers' opinions, for domestic shipment only).

	Dec. 2	Nov. 25	Nov. 18
U. S. Motor gasoline	7.50	7.50	7.50
41-43 w.w. kerosene	6.375– 6.50	6.375– 6.50	6.375– 6.50
*26-32 translucent gas oil	4.00 – 4.125	4.00 – 4.125	4.00 – 4.125

*Less than ½ of 1% sulphur.

Pacific Export Market

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gallon, except where otherwise noted.)

	Dec. 2	Nov. 25	Nov. 18
Gasoline, U. S. Motor, 53-55 Gravity	6.25 – 7.00	6.25 – 7.00	6.25 – 7.00
Gasoline, U. S. Motor-blends and special cuts	7.25 –10.00	7.25 –10.00	7.25 –10.00
Gas Oil, 30-34, per barrel	$0.80 –$1.00	$0.80 –$1.00	$0.85 –$1.00
Diesel Oil, 27 plus, per barrel	$0.80 –$1.00	$0.80 –$1.00	$0.875–$1.00
Bunker oil, 14-18, per barrel	$0.70 –$0.85	$0.70 –$0.85	$0.70 –$0.85
Fuel oil, 14-18 per barrel	$0.60 –$0.85	$0.60 –$0.85	$0.60 –$0.85
Kerosene, 38-40 w.w., 125-150 flash. per gal.	5.50 – 6.25	5.50 – 6.25	5.75 – 6.25
Cased Goods			
Gasoline, U. S. Motor	$1.75 –$1.85	$1.75 –$1.85	$1.75 –$1.85
Kerosene, 38-40 w.w., 125, 150 flash	$1.45 –$1.50	$1.45 –$1.50	$1.45 –$1.50

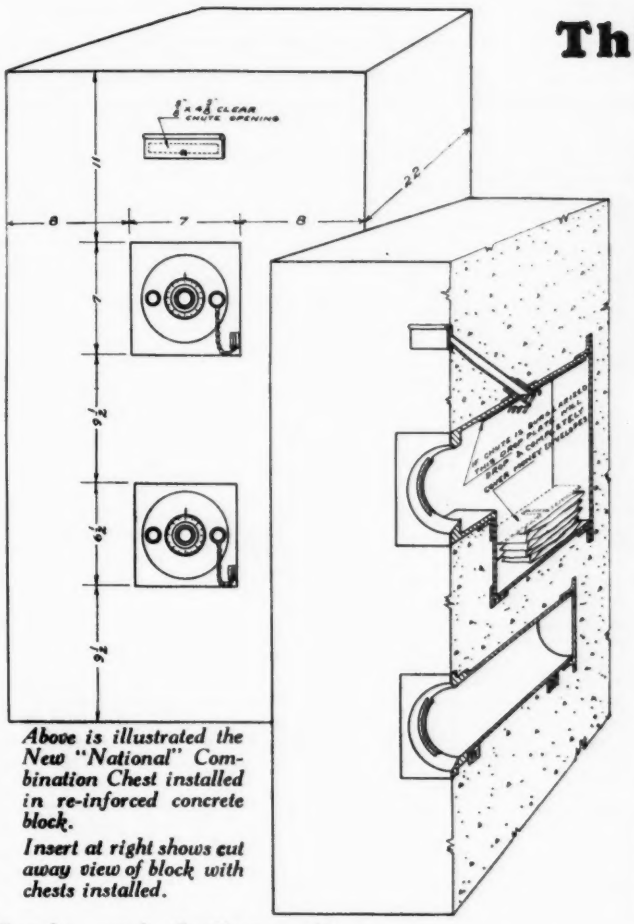
Tanker Rates

(Approximate tanker freight rates to Continental ports, in shillings per ton of 2240 pounds, British sterling; to American ports, cents per barrel.)

	Dec. 2 Crude &/or Fuel	Refined Oil &/or Spirits
Calif. to U. K. or Continental ports*	35–40	43–45
Gulf to U. K. or Continental ports*	23–25	30
North Atlantic to U. K. or Continental ports*	21–23	27
Calif. to North Atlantic ports (not E. of N. Y.)	$0.90–$1.00	$1.05
Gulf to North Atlantic ports (not E. of N. Y.)**	37	41–43

*Continental ports in the range between Bordeaux and Hamburg, both inclusive.
**Venezuela loading same rate. For Tampico 3c per bbl. additional.

This New "National" Combination Chest furnishes night protection, for attendant's change and holdup protection at all times for larger cash receipts.



Above is illustrated the New "National" Combination Chest installed in re-inforced concrete block.

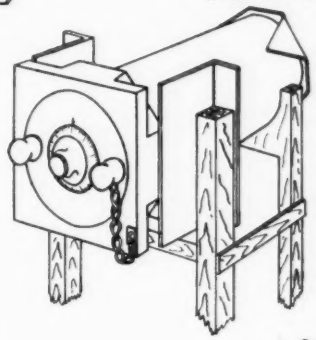
Insert at right shows cut away view of block with chests installed.

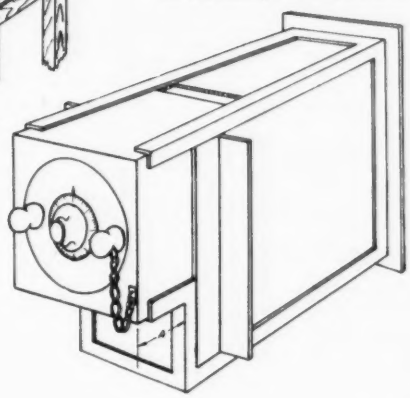
The upper chest with envelope chute receives periodical deposits of the attendant, as funds not needed for change accumulate. Combination of this chest need not be known by attendant and a sign to that effect should be displayed prominently.

With only a small amount of change exposed to holdup attack, the risk is not worthwhile, even to the most desperate thug.

The lower chest is used by the attendant for overnight protection of current change. It is of the same type already installed by the Standard Oil of Indiana in nearly a thousand of their stations in Chicago, Milwaukee, Kansas City, St. Louis and Indianapolis—as well as in hundreds of independent chain stations.

Months were spent designing this chest to not only withstand any form of attack, but to make repair cost trivial. Before purchasing these chests the Standard Oil Co. submitted them to every form of destructive test in their laboratories. Many attacks have already been successfully resisted since installation.

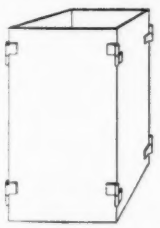




At the left (upper) is shownregular "National" Chest which is installed in lower part of concrete block.

At the left (lower) is shown the "National" Chest with envelope chute which is installed in upper part of block.

Read these Six Features—Then Act



This collapsible steel form for moulding concrete blocks is furnished with all quantity orders for "National" Combination Chests.

1. Absolute protection at small cost.
2. Removable dial discourages sledging.
3. Yale lock with special graduated spindle flush with door.
4. Immediate access after attack without services of expert.
5. Repair parts at trivial cost.
6. Eliminates the necessity of high priced insurance.

Protection for $37.50 up

ESTABLISHED 1883—44 YEARS AGO

THE NATIONAL SAFE AND LOCK COMPANY

GENERAL OFFICES—2345 EAST 69th STREET
WORKS—EAST 69th to 70th ST. AND PENNSYLVANIA R. R.

CLEVELAND, U. S. A.

THE NATIONAL SAFE & LOCK CO.
2345 East 69th St., Cleveland, Ohio

☐ Please send me further information on the protection offered by National Combination Chests.

Name.....

Address.....

City..... State.....

Tank Wagon Service Station Markets for Gasoline and Kerosene

(OIL PRICE HANDBOOK has t. w. and s. s. markets for a whole year, arranged for quick reference)

These Prices in Effect Dec. 2, 1929, as Posted by Principal Marketing Companies

S.O. NEW JERSEY TERRITORY

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Atlantic City, N. J.	14	2	16	18	13
Newark, N. J.	15	2	17	19	13
Annapolis, Md.	15	4	19	21	13
Baltimore, Md.	15	4	19	21	12
Cumberland, Md.	16	4	20	22	13
Washington, D. C.	15	2	17	19	12
Danville, Va.	16	5	21	23	12
Norfolk, Va.	15	5	20	22	12
Richmond, Va.	15	5	20	22	13
Roanoke, Va.	16	5	21	23	13
Petersburg, Va.	16	5	21	23	13
Charleston, W. Va.	15	4	19	21	13
Keyser, W. Va.	16	4	20	22	13
Parkersburg, W. Va.	15	4	19	21	12
Wheeling, W. Va.	16	4	20	22	13
Charlotte, N. C.	14	5	19	21	13
Hickory, N. C.	16	5	21	23	13
Mt. Airy, N. C.	16	5	21	23	13
Salisbury, N. C.	14	5	19	21	13
Charleston, S. C.	15	6	21	23	13
Columbia, S. C.	16	6	22	24	13

Note: 2c per gallon discount off t.w. price of gasoline to dealers and commercial consumers thru S. O. New Jersey territory.

CONTINENTAL OIL

Denver, Colo.	14	4	18	21	15.5
Pueblo, Colo.	14	4	18	21	15.5
Grand Junc., Colo.	18.5	4	22.5	25.5	19
Casper, Wyo.	16	4	20	23	14
Cheyenne, Wyo.	17	4	21	24	15.5
Butte, Mont.	20.5	5	25.5	28.5	20
Helena, Mont.	20.5	5	25.5	28.5	20
Salt Lake City, Utah	17.5	3½	21	21	17
Boise, Ida.	19.5	4	23.5	26.5	19
Twin Falls, Ida.	19.5	4	23.5	27.5	19
Albuquerque, N. M.	15	5	20	23	17

S. O. CALIFORNIA

Phoenix, Ariz.	14	4	18	22	20
Los Angeles, Cal.	16.5	3	19.5	22.5	15.5
Fresno, Cal.	17	3	20	23	17
San Francisco, Cal.	17	3	20	23	15.5
Reno, Nev.	21	4	25	28	19
Portland, Ore.	17.5	3	20.5	23.5	16.5
Seattle, Wash.	17.5	3	20.5	23.5	16.5
Spokane, Wash.	21.5	3	24.5	27.5	20.5
Tacoma, Wash.	17.5	3	20.5	23.5	16.5

Note: 4c per gal. discount to dealers off t.w. price of gasoline to customers taking tank truck delivery, thru S. O. California territory except 1c discount at Phoenix to dealers only.

S. O. LOUISIANA

Little Rock, Ark.	14	5	19	21	13
Alexandria, La.	‡15	4	‡19	21	†16
Baton Rouge, La.	14	4	18	20	†14.5
Lake Charles, La.	††16.5	4	††20.5	††22.5	†16
New Orleans, La.	*11	4	*15	15	†13
Shreveport, La.	15.5	4	19.5	21.5	†15
Lafayette, La.	**16	4	**20	**22	†14
Bristol, Tenn.	16	5	21	22	14
Chattanooga, Tenn.	15	5	20	22	14
Knoxville, Tenn.	15	5	20	22	16
Nashville, Tenn.	14	5	19	19	16
Memphis, Tenn.	15	5	20	22	12.5

Note: 2c per gallon discount off t.w. price of gasoline to dealers thru S. O. Louisiana territory.

*New Orleans gasoline prices include 1c parish tax in addition to 4c state tax, and kerosene prices include 1c state tax and 1c parish tax.

†Kerosene price in Louisiana includes 1c state tax.

**Lafayette gasoline prices include 1c parish tax in addition to 4c state tax.

††Lake Charles gasoline prices include 1c parish tax.

‡Alexandria gasoline prices include 1c parish tax.

S. O. KENTUCKY

Ashland, Ky.	13	5	18	19	15.5
Catlettsburg, Ky.	13	5	18	19	15.5
Lexington, Ky.	15	5	20	22	15.5
Louisville, Ky.	16	5	21	23	13
Covington, Ky.	15	5	20	21	15.5
Clarksdale, Miss.	13	5	18	20	12.5
Gulfport, Miss.††	17.5	5	22.5	24.5	14
Jackson, Miss.	16	5	21	23	13
Natchez, Miss.	15.5	5	20.5	20.5	14
Vicksburg, Miss.	15.5	5	20.5	22.5	14
Birmingham, Ala.	13	4	17	19	13
Mobile, Ala.‡	14	4	18	20	15
Montgomery, Ala.*	15	4	19	21	16.5
Atlanta, Ga.	14	6	20	22	†16.5
Augusta, Ga.	14	6	20	22	†15.5
Macon, Ga.	15	6	21	23	†16.5
Savannah, Ga.	16	6	22	24	†15.5
Jacksonville, Fla.	16	6	22	24	14.5
Miami, Fla.	17	6	23	25	15.5
Tampa, Fla.	16	6	22	24	14.5
Pensacola, Fla.**	12	6	18	20	14.5

Note: Net price of gasoline to dealers is 2c under posted t.w. price thru S. O. Kentucky territory.

*Local privilege tax of 1 cent on gasoline and ½ cent on kerosene at Montgomery included. ‡Mobile gasoline prices include 1c city tax

†Georgia kerosene prices include 1c state tax.

**Both tank wagon prices include 1c city tax at Pensacola which went into effect Oct. 15, 1926.

††Both tank wagon prices at Gulfport include Harrison county privilege tax of 2c.

Latest Changes in Tank Wagon Prices

Gasoline Changes

S. O. New York—S.s. only cut 2c, Rochester and Buffalo, to 18c, same as t.w., including 2c tax, **Nov. 30.**

T.w. price only cut 2c, Buffalo and Rochester districts, to 16c, including 2c tax, **Dec. 2.**

S. O. Louisiana—S.s. only up 2c, Chattanooga, to 22c, **Nov. 24.**

Continental Oil—S.s. only cut 3c, Salt Lake City, to 21c, same as t.w., including 3½c tax, **Nov. 11.**

T.w. and s.s. cut 1c, Albuquerque, to 20c and 23c respectively, **Nov. 29.**

Magnolia Petroleum—T.w. cut 1c and s.s. 2c, El Paso, to 16c and 20c respectively, **Dec. 2.**

S. O. Ohio—T.w. cut 1c, s.s. 2c; Summit county, **Nov. 27**; and t.w. up 1c, s.s. 2c, to state-wide schedule of 19c and 20c, **Dec. 1.**

T.w. cut 3c, s.s. 4c, Akron, **Nov. 27**; t.w. up 3c, s.s. 4c, Akron, to state-wide schedule of 19c and 20c, **Dec. 1.**

T.w. cut 3c, s.s. 4c, Barberton and Cuyahoga Falls, both to 16c, **Nov. 28**, and back to state-wide schedule of 19c and 20c with Summit county advance on **Dec. 1.**

T.w. up 1c, s.s. 2c, St. Paris and Urbana, to state-wide schedule of 19c and 20c, **Dec. 2.**

T.w. cut 1c, s.s. 2c, Mercer county, both to 18c, **Dec. 2.**

T.w. up 1c, s.s. up 2c, Jackson and Vinton counties, back to statewide schedule of 19c and 20c respectively, **Dec. 4.** This change is not reflected in the tank wagon table of this issue, due to prices in that table being effective as of Monday, **Dec. 2.**

S. O. New Jersey—T.w. and s.s gasoline cut 1c, Annapolis, to 19c and 21c respectively, **Nov. 22.**

Kerosene Changes

S. O. New Jersey—Kerosene cut 1c, Norfolk, to 12c t.w., **Nov. 25.**

S. O. NEBRASKA

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Omaha, Neb.	16.25	4	20.25	22.25	13.25
McCook	17.75	4	21.75	23.75	14.75
Norfolk	16.75	4	20.75	22.75	13.75
North Platte	17.75	4	21.75	23.75	14.50
Scottsbluff	17.75	4	21.75	23.75	14.25

S. O. INDIANA

Chicago, Ill.	14	3	17	18	13
Decatur, Ill.	16.2	3	19.2	20.2	13.1
E. St. Louis, Ill.	12.4	3	15.4	15.4	12.2
Joliet, Ill.	16.4	3	19.4	20.4	13.3
Peoria, Ill.	16.2	3	19.2	20.2	13.1
Quincy, Ill.	16.2	3	19.2	20.2	12.9
Indianapolis, Ind.	16.2	4	20.2	21.2	14.2
Evansville, Ind.	16	4	20	21	14
South Bend, Ind.	16.4	4	20.4	21.4	14.4
Detroit, Mich.	16.8	3	19.8	20.8	14.7
Grand Rapids, Mich.	16.7	3	19.7	20.7	14.6
Saginaw, Mich.	16.9	3	19.9	20.9	14.8
Green Bay, Wisc.	16.6	2	18.6	19.6	13.4
Madison, Wisc.	16.3	2	18.3	19.3	13.1
Milwaukee, Wisc.	16.1	2	18.1	19.1	12.9
La Cross, Wisc.	17.2	2	19.2	20.2	14
Minneapolis, Minn.	17.2	3	20.2	21.2	13.9
Duluth, Minn.	17.5	3	20.5	21.5	13.9
Mankato, Minn.	17.1	3	20.1	21.1	13.7
Des Moines, Ia.	16.5	3	19.5	20.5	13.3
Davenport, Ia.	16.5	3	19.5	20.5	13.3
Sioux City, Ia.	16.1	3	19.1	20.1	12.9
Mason City, Ia.	16.5	3	19.5	20.5	13.3
St. Louis, Mo.	*15.9	2	17.9	18.9	12.3
Kansas City, Mo.	†16.9	2	18.9	19.9	11.6
St. Joseph, Mo.	†16.5	2	18.5	19.5	12.2
Fargo, N. D.	18.9	3	21.9	22.9	15.9
Grand Forks, N. D.	19.2	3	22.2	23.2	16.2
Minot, N. D.	18.9	3	21.9	22.9	15.9
Pierre, S. D.	17	4	21	22	14.4
Huron, S. D.	17.3	4	21.3	22.3	14.7
Wichita, Kans.	14.8	3	17.8	18.8	11.8
Bartlesville, Okla.	14.5	4	18.5	19.5	11.5

S. O. Indiana's quantity contract price schedule thru territory except Chicago on tank truck deliveries of gasoline, figured from the service station price, is 2c for 500 gals. or more a month; 2½c for 2000 gals. or more a month and 3c for 6000 gals. or more a month.

In Chicago and vicinity, these discounts apply. Over 500 gals. per month, 2c per gal. off service station price; over 1,000 gals. per month, 4c per gal. off service station price.

*Includes city tax of ½c

†Includes city tax of 1c.

S. O. OHIO

Ohio state-wide.	15	4	19	20	13
Columbiana, Jackson, Meigs, Vinton, Washington, Mercer, Stark, Gallia and Darke, Counties and *13 competitive pts.	14	4	18	18	13
At †6 Competitive Points	14	4	18	19	13
Van Buren	15	4	19	19	13
Bryan and Findlay	13	4	17	17	13
Payne	11	4	15	15	13

Note: Discount to dealers and commercial accounts generally thru Ohio is 2c per gal. off t.w. price with some exceptions.

†These 6 points are: Hicksville, Arlington, Midway, Mortimer, Mendon and Nevada.

*These 13 points are: Arcadia, Perrysburg, Fostoria, Marion, Hamilton, Meeker, Ney, Miller City, Cortland, Bradford, Coolville, Lima and Piqua.

MAGNOLIA PETROLEUM

Muskogee, Okla.	12	4	16	19	13
Oklahoma City	13	4	17	20	10
Tulsa, Okla.	11	4	15	19	10
Fort Smith, Ark.†	11	†4	15	17	12
Little Rock, Ark.	14	5	19	21	13
Texarkana, Ark.*	13	*4	17	19	12
Dallas, Tex.	13	4	17	21	13
Fort Worth, Tex.	13	4	17	20	12
Houston, Tex.	9	4	13	17	11
San Antonio, Tex.	11	4	15	19	11
El Paso, Tex.	12	4	16	20	16

*Within city of Texarkana, the state tax on gasoline is 4c per gal. conforming with the Texas state tax. In this district outside of the city the 5c Arkansas tax applies.

†Within city of Fort Smith, Oklahoma tax of 4c

Above prices include these inspection fees on both gasoline and kerosene, per gallon: Alabama, 1/40c on gasoline, 1/2c kerosene; Arkansas, 1/20c on both; Florida, 1/8c on both; Georgia, 1/10c on both; Indiana, 4/25c to 1/2c on both; Kansas, 3/50c on both; Louisiana, 1/32c on gasoline; Minnesota, 3/50c on both; Missouri, 3/10c to 1/2c on both; Nebraska, 3/50c to 1/2c on both; North Carolina, 1/4c on both; North Dakota, 1/20c on both; Oklahoma, 4/25c on both; South Carolina, 1/8c on both; South Dakota, 1/10c on both; Tennessee, 2/5c on gasoline and 1/2c to 4/5c on kerosene; Wisconsin, 3/50c on both.

Kerosene inspection fees only, per gallon; Iowa, 7/100c; Michigan 1/5c to 4/5c per gal.

In Illinois, cities and villages have the power to appoint oil inspectors and fix inspection fees which is done in some instances. In some cases in the above state or other states there are local inspection fees.

Tank Wagon, Service Station Markets for Gasoline and Kerosene

Prices in Effect Dec. 2, 1929

MAGNOLIA PETROLEUM

applies. In this district outside of the city, the 5c Arkansas tax applies.

S. O. NEW YORK

Due to local price conditions at many points in S. O. New York territory, actual prices on both gasoline and kerosene are being made at under the posted tank wagon prices published below.

	Gasoline				Oil
	T.W.	Tax	Total T.W.	S.S.	T.W
Greater New York City:					
Boroughs of Manhattan, Bronx, Queens & Kings	14	2	16	18	15
Borough of Richmond	15	2	17	19	15
Albany, N. Y.	16	2	18	20	15
Buffalo, N. Y.	14	2	16	18	14
Rochester, N. Y.	14	2	16	18	13
Syracuse, N. Y.	16	2	18	20	15
Boston, Mass.	16	2	18	20	15
Augusta, Me.	16	4	20	20	15
Manchester, N. H.	16	4	20	22	15
Burlington, Vt.	16	4	20	22	15

Note: S. O. New York allows concessions of 1 to 2c per gal. to dealers under posted tank wagon prices.

*The Standard of New York does not operate stations in New York City. This figure is the retail price of a principal station operator in New York selling Socony gasoline.

ATLANTIC REFINING

Pittsburgh, Pa.	15	*	15	21	13
Philadelphia, Pa.	15	*	15	21	13
Allentown, Pa.	15	*	15	21	13
Erie, Pa.	15	*	15	19	13
Scranton, Pa.	15	*	15	21	13
Altoona, Pa.	15	*	15	21	13
Williamsport, Pa.	14	*	14	18	13
Dover, Del.	15	3	18	20	13
Wilmington, Del.	15	3	18	20	13
Boston, Mass.	16	2	18	20	15
Springfield, Mass.	16	2	18	20	15
Worcester, Mass.	16	2	18	20	15
Fall River, Mass.	16	2	18	20	13
Providence, R. I.	16	2	18	20	13
Hartford, Conn.	16	2	18	20	15
New Haven, Conn.	16	2	18	20	15
Atlantic City, N. J.	14	2	16	18	13
Camden, N. J.	15	2	17	19	13
Trenton, N. J.	15	2	17	19	13
Annapolis, Md.	16	4	20	22	13
Baltimore, Md.	15	4	19	21	12
Hagerstown, Md.	14	4	18	18	12
Richmond, Va.	15	5	20	22	13
Wilmington, N. C.	15	5	20	22	13
Brunswick, Ga.	16	6	22	24	**16.5
Jacksonville, Fla.	16	6	22	24	14.5

Note: 2c per gal. discount off t.w. price of gasoline on sales to dealers; discount to commercial accounts under contract for one year in accordance with Code of Ethics.

*4-cent state tax is collected by retail dealer and paid by him d rectly to state.

**Georgia kerosene prices include 1c state tax.

V. M. & P. NAPHTHA

(Changes ordinarily occur coincident with gasoline price changes)

	Oleum Spirits	V.M.&P. Naphtha	Cleaner Naphtha
Chicago	15.7	17.2	19
Detroit	17.4	18.9	20.7
Kansas City	†15.9	†17.4	†19.2
Milwaukee	16.4	*19.9	*21.7
Minneapolis	**19.7	**21.2	*23
St. Louis	15.6	17.1	18.9
New York		16	23
Boston		19	23

*Includes 2c state tax. †Includes 1c city tax.
**Includes 3c state tax.

Petroleum Spirits

	(Solvent)
Tank Cars	
New York refineries	11.50–12.00
Philadelphia refineries	11.50–12.00
Tank Wagon or Steel Barrels	
New York City	16–18
New England	18–19
New Jersey	16–18
Pennsylvania	16–19

Note: 2c off above t.w. prices to large buyers in some instances.

CANADA

(Per Imperial Gallon, which is 1.2 American Gallons)

ONTARIO

	Gasoline				Oil
	T.W.	Tax	T.W.	S.S.	T.W.
Toronto	19.5	5	24.5	28	20.5
Ottawa	16.5	5	21.5	25	20.5
Cochrane	24.5	5	29.5		25.5
Ft. William	22.5	5	27.5	31	22.5
Border Cities, including Windsor	18.5	5	23.5	27	19.5

(*Continued on Page 148*)

"DAYTON—G-8" Air Compressor

TIMKEN BEARING EQUIPPED

Here's a wonderful unit. Think of a Two Stage Air Compressor, with a 2 H.P. Motor and 60 gallon tank, delivering 8 cubic feet of clean air per minute for a price away below any unit that can compare with it. A wholly modern unit with Timken Roller Bearings, built to last a lifetime and give uninterrupted service.

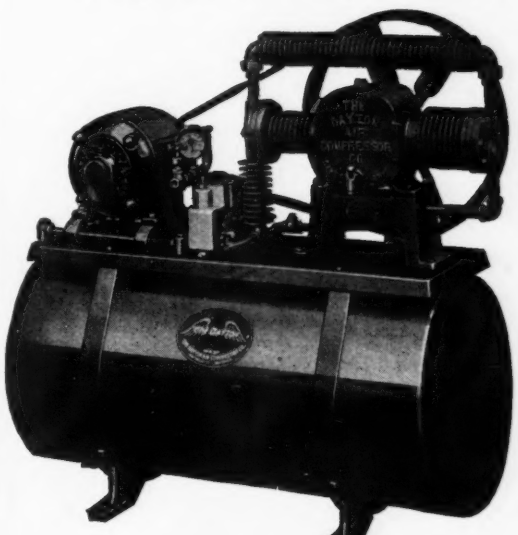
Dayton Two-Stage Models Excel Because of These Unusual Facts

They are the only two-stage compressors in the world built without the ordinary trouble makers. They have

No connecting rods—
No cotter pins—
No crosshead pins—
No bolts—
Nothing to break loose and "score" the cylinder—

Now Measure This Unit By Its Service

Compare it with any ordinary two-stage compressor.



THE DAYTON
Two-Stage "G-8"

8 cubic feet of clean air per minute.
2 H.P. Motor—
60 gallon tank—
150 lbs. pressure—
25 ft. Hose—
Automatic Spring Tension Take up on belt.
Timken Roller Bearings—
Exceptionally quiet in operation.

Send for Bulletin "G" showing specifications and prices.

DAYTON AIR COMPRESSORS

425 Valley Street — Dayton, Ohio

STORAGE TANKS, FIELD-BUILT

Guarantee Thickness Material

BROWN TANKS ARE OIL-TIGHT
Double Electric Welded

Send us your inquiry

BROWN SHEET IRON & STEEL CO.

St. Paul — Minnesota

BENETCO BENETCO

containers
that speak for themselves

and prove it to the petroleum industry. A quarter-century of skill and service in the manufacture of BENETCO steel products represents this name in industry. This union of skill and service makes the Steel Container Specialists the logical source for your container needs.

Your inquiries are cordially invited.

55 gallon grease drum

5 gallon Por-Pail

100 pound grease drum

55 gallon oil drum

WILSON & BENNETT MFG. CO.
the Steel Container Specialists
CHICAGO NEW YORK
Sales representatives in principal cities

Crude Oil Prices (in Effect Dec. 2, 1929)

(Crude prices for the whole year in OIL PRICE HANDBOOK published annually)

EASTERN FIELDS

(All Penna. Crude prices effective Oct. 1, 1929)

(Posted by Joseph Seep Purchasing Agency)

Penna. Grade Oil in New York Transit Lines (Alleghany, N. Y. District) *$3.05
Bradford District Oil in National Transit Lines (Bradford District) *3.05
Penna. Grade Oil in National Transit Lines (Other Pennsylvania) *3.05
Penna. Grade Oil in Southwest Penna. Pipe Lines (Other Pennsylvania) 3.00
Penna. Grade Oil in Eureka Pipe Lines (West Virginia) 2.90
Penna. Grade Oil in Buckeye Pipe Lines (Macksburg, O. district) 2.70
Corning Grade in Buckeye Pipe Lines (Ohio) (Effective May 22, 1929) 1.90
Corning, O., heavy grade (Effective May 22, 1929) 1.80
Somerset Oil in Cumberland Pipe Lines (Kentucky) (Effective Nov. 12, 1929) 1.55
Somerset Oil in Eureka Pipe Lines (Effective Nov. 12, 1929) 1.29
Ragland Grade in Cumberland Pipe Lines (Kentucky) (Effective Jan. 29, 1929) $0.60

***Oil run prior to July 1, 1929 is $3.00 per bbl.**

(Posted by Stoll Oil Refining Co.)

Oil City, Ky., oil in Stoll lines (Effective Oct. 7, 1929) $1.70

MICHIGAN

(Posted by Dixie Oil Co.)

Traverse and Dundee (Muskegon):

32-32.9	$1.25	39-39.9	$1.60
33-33.9	1.30	40-40.9	1.65
34-34.9	1.35	41-41.9	1.70
35-35.9	1.40	42-42.9	1.75
36-36.9	1.45	43-43.9	1.80
37-37.9	1.50	44 and above	1.85
38-38.9	1.55		

(Posted by Pure Oil Co.)

Midland, Midland County $1.70

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

Effective May 21, 1929

Wooster	$1.90	Princeton	$1.75
Lima	1.80	Illinois	1.75
Waterloo	1.20	Plymouth	1.28
Indiana	1.57	West Kentucky	1.68

CANADIAN CRUDE

Posted by Imperial Oil Refineries, Ltd.

Petrolia $2.20
Oil Springs 2.27

OKLAHOMA, KANSAS and NORTH TEXAS

Prices of Pairie Oil & Gas Co.

(In Oklahoma, Kansas, North and East Central Texas)

Effective May 20, 1929

Below 25	$0.85	35-35.9	$1.40
25-25.9	0.90	36-36.9	1.45
26-26.9	0.95	37-37.9	1.50
27-27.9	1.00	38-38.9	1.55
28-28.9	1.05	39-39.9	1.60
29-29.9	1.10	40-40.9	1.65
30-30.9	1.15	41-41.9	1.70
31-31.9	1.20	42-42.9	1.75
32-32.9	1.25	43-43.9	1.80
33-33.9	1.30	44 and above	1.85
34-34.9	1.35		

Humble Oil & Refining Co. Prices

(Ranger, North Texas, Mexia, Powell, Boggy Creek, Richland, Wortham, Lytton Springs, Currie, Moran and Nocona crudes all in Texas.)

May 20, 1929, same schedule as Prairie in above fields.

Magnolia Petroleum Co.

(In Oklahoma, Kansas and North and East Central Texas)

May 20, 1929, Magnolia posted in above fields and in Panola Co., same schedule as Prairie, except these grades:

Below 26	$0.70	29-29.9	0.95
26-26.9	0.75	30-30.9	1.05
27-27.9	0.85	31-31.9	1.15
28-28.9	0.90		

May 20, 1929, Glasscock, Crane, Upton, Winkler, Howard and Mitchell Counties same prices as Humble's postings in West Texas which see.

Iatan district $0.93
Corsicana heavy 0.80
Luling 0.90
Mirando 0.90

Carter Oil Co.

(Oklahoma and Kansas)

May 20, 1929, same schedule as Prairie except Carter does not post oil below 25.

PANHANDLE, TEXAS

Humble Oil & Refining Co.

Effective May 20, 1929

Hutchinson and Carson Counties:

Below 32	$0.90	38-38.9	$1.25
32-32.9	0.95	39-39.9	1.30
33-33.9	1.00	40-40.9	1.35
34-34.9	1.05	41-41.9	1.40
35-35.9	1.10	42-42.9	1.45
36-36.9	1.15	43-43.9	1.50
37-37.9	1.20	44 and above	1.55

Wheeler County:

Below 30	$0.90	37-37.9	$1.30
30-30.9	0.95	38-38.9	1.35
31-31.9	1.00	39-39.9	1.40
32-32.9	1.05	40-40.9	1.45
33-33.9	1.10	41-41.9	1.50
34-34.9	1.15	42-42.9	1.55
35-35.9	1.20	43-43.9	1.60
36-36.9	1.25	44 and above	1.65

Gray County:

Below 29	$0.90	37-37.9	$1.35
29-29.9	0.95	38-38.9	1.40
30-30.9	1.00	39-39.9	1.45
31-31.9	1.05	40-40.9	1.50
32-32.9	1.10	41-41.9	1.55
33-33.9	1.15	42-42.9	1.60
34-34.9	1.20	43-43.9	1.65
35-35.9	1.25	44 and above	1.70
36-36.9	1.30		

Above prices met by The Texas Co. and Magnolia on May 20.

WEST TEXAS

Humble Oil & Refining Co.

Effective May 20, 1929

Winkler, Crane, Upton, Crockett, and Pecos Counties, also Lea County, N. Mex.

Below 25	$0.70	31-31.9	0.98
25-25.9	$0.74	32-32.9	$1.02
26-26.9	$0.78	33-33.9	1.06
27-27.9	0.82	34-34.9	1.10
28-28.9	0.86	35-35.9	1.14
29-29.9	0.90	36 and above	1.18
30-30.9	0.94		

Howard and Glasscock counties:

Effective Nov. 27, 1929

Below 25	$0.70	31-31.9	$0.90
25-25.9	.74	32-32.9	.92
26-26.9	.78	33-33.9	.94
27-27.9	.82	34-34.9	.96
28-28.9	.84	35-35.9	.98
29-29.9	.86	36 and above	1.00
30-30.9	.88		

May 20, 1929, The Texas Co. posted same prices as Humble in Crane, Upton, Pecos and Winkler., and Magnolia in Crane, Upton, Winkler, Glasscock, Howard and Mitchell.

SOUTHWEST TEXAS

(Posted by Humble Oil & Refining Co.)

Effective May 20, 1929

Mirando $0.90
Salt Flat 1.25

NORTH LOUISIANA—ARKANSAS FIELDS

Prices of Standard Oil Co. of Louisiana

Caddo, Homer, Haynesville, Bull Bayou, El Dorado, Crichton, De Soto and **Cotton Valley.

Effective May 22, 1929

Below 28	$1.00	36-36.9	$1.45
28-28.9	1.05	37-37.9	1.50
29-29.9	1.10	38-38.9	1.55
30-30.9	1.15	39-39.9	1.60
31-31.9	1.20	40-40.9	1.65
32-32.9	1.25	41-41.9	1.70
33-33.9	1.30	42-42.9	1.75
34-34.9	1.35	43-43.9	1.80
35-35.9	1.40	44 and above	1.85

**Cotton Valley, below 36, $0.85. Beginning with 36-36.9, same schedule as above.

Smackover, below 24 ..... $0.85
do 24 and above 1.00
Bellevue 1.30
*Urania, La. 1.10
†East El Dorado 0.75

*Posted by Louisiana Oil Refining Corp.

†Posted by Magnolia Petroleum Co.

May 20, The Texas Co. same schedule in Louisiana as Standard, plus these grades: 24-24.9, $0.85; 25-25.9, $0.90; 26-26.9, $0.95; 27-27.9, $1.00.

May 22, Magnolia, Atlantic, Shreveport-Eldorado Pipe Line, Louisiana Oil, and Gulf Companies met Standard schedule in Louisiana-Arkansas fields.

STEPHENS, ARKANSAS

Louisiana Oil Refining Corp., and Atlantic Oil Producing Co.

Effective May 22, 1929

Below 28	$0.90	30-30.9	$1.02
28-28.9	0.94	31-31.9	1.06
29-29.9	0.98	32 and above	1.10

GULF COASTAL

Posted by Humble Oil & Refining Co.

Effective May 20, 1929

Grades A	$1.30	29-29.9	$1.30
Grades B:		30-30.9	1.33
Below 25	$1.15	31-31.9	1.36
25-25.9	1.18	32-32.9	1.39
26-26.9	1.21	33-33.9	1.42
27-27.9	1.24	34-34.9	1.45
28-28.9	1.27	35 and above	1.48

Fields classified as A and B are Spindletop, Goose Creek, Hull, Liberty, Sour Lake, West Columbia, Orange, Boling, Pierce Junction, Sugarland and Raccoon Bend. All other fields are Grades A only

HOUSTON—On Nov. 27 Humble Oil & Refining Co. revised its price schedule on Howard county and Glasscock county crude in West Texas which resulted in a cut of from 2 to 18 cents on oils above 28 degrees gravity. Its prices for oil below 28 gravity were unchanged. Other West Texas crudes were unchanged.

The new prices range from 84 cents per barrel for 28 to 28.9 gravity, with 2 cent differential for each succeeding degree of gravity, up to and including 36 and above, which is $1.00 per barrel. For new prices, see Humble's prices in these two counties in the crude price table of this issue.

* * *

OIL CITY—On Dec. 2 Joseph Seep Purchasing Agency posted Wayne district, West Virginia, crude in Cumberland lines at $1.42 per barrel. This is an initial posting of this crude by the Seep Agency. The oil is about on a par with Somerset, Ky., crude for which the company now pays $1.55 per barrel.

PITTSBURGH, Pa.—"Everything for Mine and Industrial Safety" is the title of a new 160 page catalog recently issued by the Mine Safety Appliances Co., Pittsburgh. It contains a large number of illustrations, many in colors, of safety equipment for use in mines and for other industries.

Among the devices described are gas and air measuring devices, oxygen breathing apparatus, gas mask respiratory protective equipment, gas detectors and recorders, resuscitation equipment, safety lamps and accessories and a complete line of first-aid supplies.

Copies of the booklet may be obtained by writing the company's advertising department.

Exports From Tampico District

(All figures in barrels)

Company	September	October
Transcontinental-Rayon Cos. (Standard of New Jersey)	540,477	311,068
Huasteca Petroleum Co. (Pan American)	1,046,780	843,621
Mexican Eagle Oil Co. Ltd. (El Aguila)	684,944	661,642
Cia. Mexicana Holandesa "La Carona"	167,360	111,228
Cia. Mexicana Minerva of S. A.	54,133	.....
The Texas Co. of Mexico S. A.	123,508	62,675
Sinclair Mexican Companies	184,971	104,313
Empire Gas & Fuel Co.	174,335	97,320
Mexican Atlas Oil Co.	37,662	.....
Panuco Boston Oil Co.	40,635	.....
Pierce Oil Corp.	.....	4,486
Mexican Gulf Oil Co.	134,195	198,611
TOTALS	3,188,800	2,394,964

A NEW Leader DRAIN RACK

Fig. 616—24″ high
$62.50

Fig. 626
30″ high
$73.00

Prices F. O. B. Decatur, Illinois.

Keeping step with the automobile industry Leader has developed a new model Drain Rack, built so that any car—old or new—can mount the rack without interference.

Made in two sizes:

Fig. 616—24″ high, 9½″ runways $62.50

Fig. 626—30″ high; 9½″ runways $73.00

Prices F. O. B. Decatur, Illinois. For detailed specifications, write for Drain Rack Bulletin.

LEADER IRON WORKS

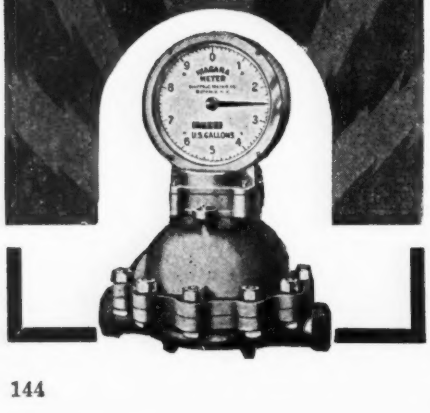
2112 N. Jasper St. Decatur, Ill.
21 E. 40th St., New York, N. Y.

DEPENDABILITY

The Niagara meter never forgets—never jots down wrong totals—never delivers uncounted gallons of gasoline or oil that cut into profits. If the Niagara registers 50, fifty gallons have gone through—if 50,000, fifty thousand gallons have been delivered, and recorded so they'll be paid for. It is accurate.

The Niagara installed today is installed for years from now—its dependability is permanent. It is "rugged" structurally and simple mechanically. Send today for the new catalog of these familiar meters.

BUFFALO METER COMPANY
2889 Main Street
Buffalo, N. Y.



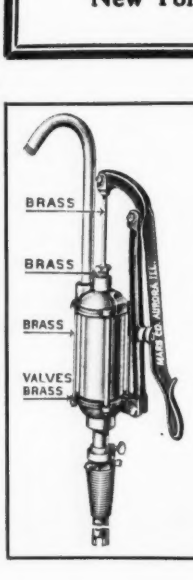
Skilled Supervision
Guarantees the Quality of Gulf Products

COASTAL AND PARAFFINE CRUDES
GASOLINE — LUBRICATING OILS
NAPHTHA — GAS — OILS
WAX — PETROLEUM COKE
CYLINDER—ENGINE—CORDAGE

Gulf Refining Company

General Sales Offices
PITTSBURGH, PA.

District Sales Offices
New York, Boston, Philadelphia, Louisville, Atlanta, Houston, New Orleans



FOR GASOLINE, KEROSENE ALCOHOL & OILS

Pump for use in pumping direct out of barrel, or can be connected to underground storage tank. With or without hose. Economical and practical Pump for farm trade or oil fields, etc.

8 gal. per minute. Piston type. Long fulcrum. Easy pumping.

MARS CO. exclusive manufacturer of small Pumping Units. Service, Price and Construction guaranteed. Write us what is wanted.

MARS CO. *Est. 1914* **Aurora, Ill.**

Crude Oil Prices (in Effect Dec. 2, 1929)

(Crude Oil Prices for the whole year in OIL PRICE HANDBOOK published annually)

GULF COASTAL

Prices of The Texas Co.

Effective May 20, 1929

Grades A	$1.30
‡Grades B (light crude):	
35–35.9	$1.49
36–36.9	1.53
37–37.9	1.57
38–38.9	1.61
39–39.9	1.65
*Grades B	$1.15
40–40.9	$1.69
41–41.9	1.73
42–42.9	1.77
43–43.9	1.81
44 and above	1.85

*Grades B include all heavy crudes which do not meet tests for Grades A or for Gulf Coast light crude.

‡The Texas Co.'s gravity and price schedule on all oil below 35° is same as Humble's postings on Grades B.

ROCKY MOUNTAIN FIELDS

Prices of Ohio Oil Co., and Midwest Refining Co.

(Salt Creek prices effective May 20, 1929)

‡Salt Creek 29–29.9	$1.10
" " 30–30.9	1.15
" " 31–31.9	1.20
" " 32–32.9	1.25
" " 33–33.9	1.30
" " 34–34.9	1.35
" " 35–35.9	1.40
" " 36–36.9	1.45
" " 37 and above	1.50
Elk Basin	1.65
Grass Creek light	1.65
Bid Muddy	$1.43
Lance Creek	1.68
Rock Creek	1.40
Mule Creek	1.20
Rex Lake	1.10
‡Osage	1.65
‡Cat Creek, Mont.	1.65
Sunburst, Mont.	1.75
‡Hogback, N. Mex.	1.70
Artesia, N. Mex.	1.08

‡Posted by Midwest Refining Co. Midwest also buys Grass Creek light and Elk Basin.

CALIFORNIA

***Standard Oil Co. of California**

Gravity	Alamitos Heights Huntington Beach Signal Hill Seal Beach	Inglewood Torrance	Olinda-Brea Canon †Richfield	Athens-Rosecrans Dominguez	Elwood Terrace	Whittier La Habra	Coyote Hills	Santa Fe Springs	Newhall McKittrick Kern River	Midway Sunset Buena Vista & Elk Hills	Lost Hills	Coalinga	Wheeler Ridge	Montebello	Kettleman Hills	*Santa Maria (Orcutt)	*Ventura
14–14.9	$ .70	$ .70	$ .70	....	....	$ .70	$ .70	.....	$ .50	$ .50	$ .50	$ .50	$ .50	$ .70	....	$ .65	$ .70
15–15.9	.70	.70	.70	....	....	.70	.70	....	.50	.50	.50	.50	.50	.70	....	.65	.70
16–16.9	.70	.70	.70	....	....	.70	.70	....	.50	.50	.50	.50	.50	.70	....	.65	.70
17–17.9	.70	.70	.70	....	....	.70	.70	....	.50	.50	.50	.50	.50	.70	....	.65	.70
18–18.9	.75	.75	.75	....	....	.75	.75	....	.50	.56	.56	.56	.56	.70	....	.70	.75
19–19.9	.80	.80	.80	....	....	.80	.80	....	.50	.62	.62	.62	.62	.75	$1.65	.70	.80
20–20.9	.85	.85	.85	....	....	.84	.84	....	....	.68	.68	.68	.68	.80	for	.70	.85
21–21.9	.89	.89	.89	....	....	.88	.88	.89	....	.74	.74	.74	.74	.85	55°	.86	.86
22–22.9	.93	.93	.93	....	....	.91	.91	.92	....	.80	.80	.80	.80	.90	gravity	.87	.87
23–23.9	.97	.97	.97	....	....	....	.94	.95	....	.85	.85	.85	.85	.95	and	.90	.90
24–24.9	1.01	1.01	1.01	1.01	....	....	.97	.98	....	.90	.90	.88	.88	.98	over	.94	.94
25–25.9	1.05	1.05	1.05	1.05	....	....	1.00	1.01	....	.95	.95	.91	.91	1.01	....	.98	.98
26–26.9	1.09	1.09	1.09	1.09	....	....	1.04	1.04	....	1.00	1.00	.94	.94	1.04	....	1.02	1.02
27–27.9	1.13	1.13	1.13	1.13	....	....	1.08	1.07	....	1.05	1.05	.98	.97	1.07	....	....	1.06
28–28.9	1.17	1.17	1.17	1.17	....	....	1.12	1.10	....	1.10	1.10	1.02	....	1.10	....	....	1.10
29–29.9	1.21	....	1.21	1.21	....	....	1.16	1.15	....	1.16	1.16	1.06	....	1.13	....	....	1.14
30–30.9	1.25	....	1.25	1.25	....	....	1.20	1.20	....	1.22	1.22	1.10	....	1.16	....	....	1.18
31–31.9	1.30	....	1.30	1.30	....	....	....	1.25	....	1.28	1.28	1.14	....	....	....	....	1.23
32–32.9	1.35	....	....	1.35	....	....	....	1.30	....	1.34	1.34	1.18	....	....	....	....	1.28
33–33.9	....	....	....	1.41	....	....	....	1.35	....	1.40	1.40	1.22	....	....	....	....	1.34
34–34.9	....	....	....	1.47	$1.16	....	....	1.40	....	....	1.46	1.26	....	....	....	....	....
35–35.9	....	....	....	1.53	1.22	....	....	1.45	....	....	1.52	1.30	....	....	....	....	....
36–36.9	....	....	....	1.59	1.28	....	....	1.50	....	....	....	....	....	....	....	....	....
37–37.9	....	....	....	1.65	1.34	....	....	1.55	....	....	....	....	....	....	....	....	....
38–38.9	....	....	....	1.71	1.40	....	....	1.60	....	....	....	....	....	....	....	....	....
39–39.9	....	....	....	1.77	1.46	....	....	1.65	....	....	....	....	....	....	....	....	....
40–40.9	....	....	....	1.83	1.52	....	....	....	....	....	....	....	....	....	....	....	....
41–41.9	....	....	....	1.89	1.58	....	....	....	....	....	....	....	....	....	....	....	....
42–42.9	....	....	....	1.95	1.64	....	....	....	....	....	....	....	....	....	....	....	....

*Santa Maria and Ventura postings are by Union Oil Co. Union Oil Co. posts same prices in all above fields as Standard except it does not post prices in Wheeler Ridge, Whittier, La Habra, Newhall and Kettleman Hills. Standard does not contract for crude testing 11-13.9 gravity, but pays 45c a barrel when purchased.

†Richfield posted only to 30-30.9 at $1.25.

REFINERS' and COMPOUNDERS' SUPPLIES

Following are average market prices for materials used by refiners and compounders effective on the date shown.

Refiners' Supplies

	Dec. 2	Nov. 25
Soda Ash light 58% bags, cwt.	$1.32	$1.32
Silicate of Soda 60 deg. drums, cwt.	$1.55	$1.55
Silicate of Soda 40 deg. tank cars, cwt.	$0.60	$0.60
Silicate of Soda 40 deg. drums cwt.	$0.80	$0.80
Sal Soda wks.	$1.00–1.05	$0.90–1.00
Caustic Soda 76% solid, cwt..	$2.90	$2.90
Sulfuric Acid 60 deg. tank cars, f.o.b. shipping point per ton	$11.00	$11.00
Oleum 20%, fuming sulfuric, tank cars, wks.	$18.50	$18.50
Sulfur, flowers of, cwt.	$3.10–4.00	$3.10–4.00
Liquid Chlorine, tank cars, wks, lb.	3.50–5.00	3.50–5.00

Compounders' Supplies

	Dec. 2	Nov. 25
Vegetable Oils		
Tinseed carloads, spot, lb.	14.80	15.30
Lanks, spot	14.00	14.50
Soya Bean, Tanks, coast, lb.	10.50-11.00	10.50-11.00
Oleic Acid		
Distilled, tanks, lb.	9.75	9.75
Distilled, bbls, lb.	10.625	10.625
Saponified, tanks, lb.	9.75	9.75
Saponified, bbls, lb.	10.625	10.625
Lard Oils		
Prime Winter Strained, lb.	15.25	15.25
Extra Winter Strained, lb.	12.75	12.75
Extra, lb.	12.50	12.50
Extra No. 1, lb.	12.00	12.00
No. 1, lb.	11.75	11.75
No. 2, lb.	11.50	11.50
Tallow oil, lb.	11.00	11.00
Neatsfoot Oil		
Pure, bbls, lb.	14.50	14.50
Extra, bbls, lb.	12.25	12.25
No. 1 bbls, lb.	12.00	12.00
Cold Pressed, lb.	12.50	12.50
Fish Oils		
Menhaden Oil		
Light Pressed, gal.	70	70
Light Pressed, tank cars, N. Y., gal.	58–60	58–60
White bleached, gal.	76	76
Yellow bleached, gal.	71	71
Whale, extra winter bleached, gal.	82	82
Naval Stores		
Steam, distilled turpentine, N. Y., gal.	50	50
Steam distilled turpentine, Savannah, gal.	47	47
Gum turpentine, N. Y., gal.	53	53
Gum turpentine, f.o.b. cars Savannah, gal.	47	47
Wood Rosin F, N. Y., gal.	$7.70	$7.70
Wood Rosin F, Savn'h, bbl.	$6.90	$6.90
Gum Rosin B, N. Y., bbl.	$8.30	$8.30
Gum Rosin B, f.o.b. cars Savannah, bbl.	$7.60	$7.60
Rosin oil, pure, gal.	58	58
Rosin oil, compounded, gal.	47	47
Pine Tar		
Kiln burnt, bbl.	$13.00–14.00	$13.00–14.00
Retort, bbl.	$13.50–14.50	$13.50–14.50
Alcohol		
Denatured Formula 5, in bbls., per gal.	59–66	59–66

OIL STOCKS AND FINANCES

National Petroleum News

Sunray Oil Corp. Buys Control Of Operators Oil Co.

Staff Special

TULSA, Nov. 30

SUNRAY OIL CORP., which has been quite aggressive the past year in acquiring proved and wildcat properties has bought controlling interest in the Operators Oil Co. The latter company has figured largely in the Texas Panhandle news for several months, having brought in a number of large wells in the Gray county, high gravity oil pools.

Consideration in this deal was stock and cash, figuring out about two million dollars. Present daily production is about 4,000 barrels, part of it in the flush stage. Most of it is in the Bowers and Finley pools of Gray county. Total acreage is around 10,000 in Texas, Oklahoma and New Mexico.

Following the completion of the transaction James G. Cloud, president of Operators Oil; Ray M. Dunnett, secretary-treasurer and John Wheeler, vice-president, resigned.

A. K. Swann, Sunray counsel, was elected president of Operators Oil; R. S. McFarland, vice-president of Sunray Oil Co., the operating subsidiary of the Sunray corporation, became vice-president of Operators and W. D. Forster secretary-treasurer. These three, with R. P. Abele, general superintendent of Sunray production and E. F. Hamm, of Chicago, make up the directorate of Operators Oil Co. James G. Cloud presently will become a director of Sunray.

Early in November the Sunray purchased stock control of the Homaokla Oil Co., an old independent producing and refining company, which brought the Sunray's daily net production to about 5,300 barrels and gave it a 3,000-barrel capacity skimming plant refinery at Allen, Okla.

An earlier transaction with the Anderson-Pritchard Oil Corp. gave Sunray considerable acreage and production in the Allen district, where it had previously made a start by buying properties of Ramsey Brothers. From Anderson-Pritchard the Sunray also bought 5,000 acres of undeveloped properties in the Oklahoma City area.

Another purchase was made from the Alco Royalty Co., consisting of 600 barrels daily net production in Oklahoma and Kansas and considerable acreage, both royalties and leases.

Sunray Oil Corp., the holding company, is domiciled in New York City. The operating subsidiary has general offices in Tulsa. The company was organized in 1920 under the laws of Arizona by Alfred Sun and C. W. Ray, of Oklahoma City. It was soon taken over by C. C. Hamilton, prominent New York attorney, and his associates.

Shortly thereafter C. H. Wright, of Oklahoma City, theretofore outstanding in the banking and mercantile fields, became associated with the company. He is vice-president of the holding company and president of the operating company, living in Tulsa.

Financial sponsorship of the company is by Dillon, Read & Co., a bond issue early this year having been underwritten by these bankers. Directors of the corporation are C. C. Hamilton, C. H. Wright, C. I. McLaughlin, New York; Congressman Hamilton Fish, Jr., New York; W. N. Croxton, New York; W. E. Hightower, vice-president of the American First National Bank, Oklahoma City; Chauncey L. Waddell, of Dillon, Read & Co. and Murray M. Doan, director of the First National Bank, Tulsa, and widely known Mid-Continent capitalist and oil operator.

The operating company is headed by Mr. Wright. R. S. McFarland, one time president of the American Association of Petroleum Geologists and for years superintendent of the land department of the Twin State Oil Co., became vice-president of the Sunray company several months ago. R. P. Abele is general superintendent of production and W. D. Forster heads the accounting department.

Union Tank Car to Split Capital Stock 4 for 1

CLEVELAND, Nov. 30.—Special meeting of Union Tank Car Co. stockholders has been called for Dec. 23 to vote on a proposal to split the company's shares 4 for 1, and to change the shares from $100 a share par to no par value.

It also will be proposed to increase the number of shares to 3,000,000. About 1,250,000 will be required for the exchange if it is authorized. The company at present has outstanding 312,062 shares.

This company was organized in 1891 to transport oil for the Standard Oil Co. and since the dissolution it has supplied the various Standard Oil companies with tank cars of which it has more than 35,000 and recently ordered 1000 more.

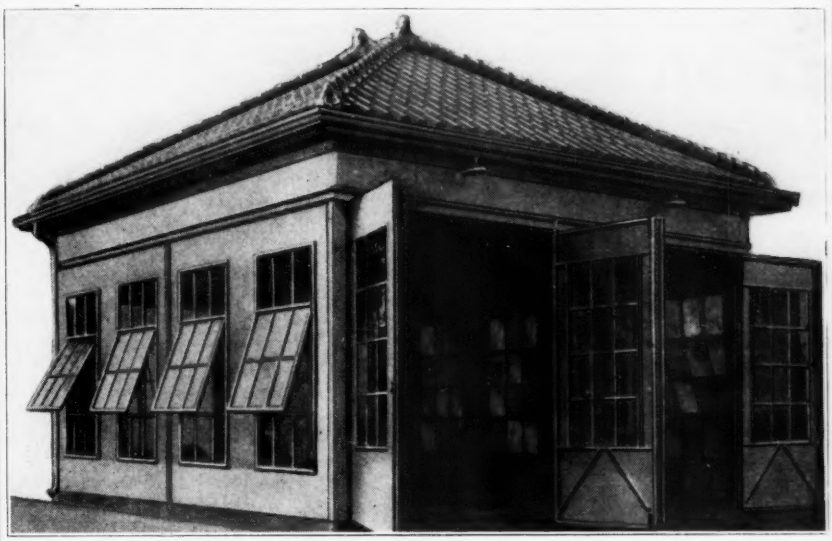
CLEVELAND, Nov. 29.—The Illinois road fund was increased $2,121,000 recently when the Standard Oil Co. of Indiana decided not to appeal its case for a refund of the illegal gasoline tax of 1927. There is still about $5,000,000 collected under the law which is impounded pending settlement of litigation.

Treating Plants

THE M. W. KELLOGG CO.

225 Broadway • New York

Dallas, Texas ..... *714 Kirby Bldg.*
Tulsa, Okla ..... *Philtower Bldg.*
Los Angeles, Cal ..... *1031 So. Broadway*



The Edwards All-Steel Lubritorium

The discriminating autoist of today prefers to personally superintend the greasing of his car and is taking it to be serviced where it can be done inside and out of the cold. The above illustration shows a building that is light and with maximum ventilation. Can be made to cover any number of pits. Be sure to get our prices.

We also manufacture the simplest to the most elaborate gasoline and oil filling stations and steel buildings. Put your own individuality in your Filling Stations—Let us help you work this out.

THE EDWARDS MANUFACTURING CO.

524-544 Eggleston Ave. Cincinnati, Ohio

DAMASCUS

Coldflo Greases

for

Transmissions

Damascus Mfg. Corp.

9501 Cassius Ave.

Cleveland Ohio

9-23

AGAIN

Brookins Sales

Eclipse all Records

There are definite reasons for Brookins overwhelming popularity + + +

With sales greater than in any other twelve-month period in history—with a new and improved product successfully launched—with more Brookins Measures in use than ever before—Brookins wishes to thank you for your endorsement . . . and to draw your attention to this fact:

There are definite reasons for this overwhelming preference.

In the first place Brookins Measures are built *right*. They were designed only after a careful study of filling station needs. They lighten work and they save time.

Then Brookins Measures are built *strong*. They are the sturdiest measures modern industry can turn out. They'll stand the jars, strains, wear and tear of filling station use for many years.

Your Jobber Will Show You

If you've never used a Brookins Measure get your jobber salesman to show you one. Look it over carefully. Test it yourself. Then decide to equip your station complete with these truly up-to-date oil measures. And in the meantime write for full information about the Brookins Oil Measure and other Brookins products.

BROOKINS MANUFACTURING COMPANY
Hawthorne & Albany Sts.
Dayton, Ohio

Brookins
SERVICE STATION EQUIPMENT

"An Honest Measure for Honest Oil"

Transactions in Oil Shares on New York Stock Exchange

1928 High	1928 Low	1929 High	1929 Low	Listed Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Nov. 30 Sales	First	High	Low	Last	Change
43⅞	27⅛	42⅝	17½	(sh) 922,075	N.P.	Amerada Corp	50cQ	Oct. 31, 29	4,500	21¾	22	21½	21⅞	+ ⅜
85	51¼	64¾	12½	(sh) 209,180	N.P.	American Republics Corp	....	.....	1,500	19½	21⅞	19½	20	— ⅝
53⅜	37½	47¼	40	$56,000,000	$25	Associated Oil	50cQ	Sept. 30, 29	.....	.....	.....	.....	.....	.....
62½	50	77⅞	30	50,000,000	25	Atlantic Refining	‡25cQ	Sept. 15, 29	24,300	42½	42⅝	40½	41	— 1⅝
53	20	49⅛	20	47,261,125	25	Barnsdall Corp. A	50cQ	Nov. 7, 29	18,600	26⅞	26⅞	25⅛	25¾	— ⅝
51⅛	20	49	38⅛	300,525	25	do B	50cQ	Nov. 7, 29	.....	.....	.....	.....	.....	.....
24½	12¼	32⅞	15	(sh) 956,075	N.P.	Beacon Oil	....	.....	2,900	17½	17½	16½	16½	— 1
36	25¼	34½	25	$51,524,150	$25	California Petroleum	....	Jan. 1, 29	30	28	28	28	28	0
.....	.....	37¾	18	(sh) 4,634,163	N.P.	Continental Oil (Delaware)	....	.....	28,700	27	27¼	25	26⅜	— ⅝
94⅞	68	94¾	42¼	21,031,400	100	General Asphalt	.....	.....	20,600	54	54	50⅛	50⅜	— 2⅞
141	110⅛	138	103½	6,628,200	100	do pfd	$1.25Q	Dec. 2, 29	.....	.....	.....	.....	.....	.....
167	79	109	23	25,000,000	100	Houston Oil	.....	.....	7,700	50	51	45¾	47	— 3½
38⅜	21¾	39¼	17¾	(sh) 1,333,157	N.P.	Independent Oil & Gas	50cQ	Oct. 31, 29	6,900	25¼	25¼	24½	24⅝	— ¼
39⅝	9	53	13	$4,299,190	$10	Indian Refining	....	Dec. 15, 20	19,800	20⅞	21⅜	19⅜	19½	— 1½
37¼	8½	51¼	11½	4,550,110	10	do ctfs	.....	.....	5,100	18¼	19¼	18	18¾	— ½
185	140	165	160	1,977,700	100	do pfd. new	$1.75Q	Oct. 1, 29	.....	.....	.....	.....	.....	.....
39⅛	27⅜	38⅜	16½	3,992,387	N.P.	Lago Oil & Transport	....	May 2, 27	700	22¼	22⅜	21¼	22⅜	— ⅝
19⅜	9⅜	18	7	(sh) 1,187,298	N.P.	Louisiana Oil Refining	.....	.....	7,300	9¾	10	9½	9¾	— ¼
96	78	100¼	80	$4,000,000	$100	do pfd	$1.62½	Nov. 15, 29	100	85	85	85	85	+ 1
25½	12½	18½	10	(sh) 330,000	N.P.	Maracaibo Oil	.....	.....	.....	.....	.....	.....	.....	.....
360	250	295	176	$45,942,800	$100	Mexican Petroleum	$3Q	Oct. 20, 29	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	12,000,000	100	do pfd	$2Q	Oct. 20, 29	.....	.....	.....	.....	.....	.....
73	4⅝	69⅜	9¼	(sh) 995,500	N.P.	Mexican Seaboard	.....	Nov. 15, 24	27,000	17¾	19¼	16⅝	18	— ½
44½	25⅛	39⅞	22⅛	(sh) 1,857,461	N.P.	Mid-Continent	50cQ	Nov. 15, 29	7,900	29⅞	29⅞	28⅛	28¾	— ⅝
120½	103¼	121	120¼	$6,718,000	$100	do pfd	$1.75Q	Sept. 1, 29	.....	.....	.....	.....	.....	.....
7⅜	2⅜	5⅛	¾	23,849,720	10	Middle States	....	July 1, 23	.....	.....	.....	.....	.....	.....
5⅞	1½	3⅝	⅞	5,950,500	10	do ctfs	....	.....	300	1¼	1¼	1¼	1¼	0
2¼	1	1½	⅝	(sh) 3,500,000	N.P.	Pacific Oil	....	.....	2,100	⅞	1	⅞	⅞	0
55½	38¼	69	40¼	$50,000,000	$50	Pan American P. & T.	....	Oct. 20, 27	8,500	62½	62½	61	61	— 1¾
58⅞	37¾	69¼	40½	121,101,400	50	do B	....	Oct. 20, 27	19,600	62⅞	62⅞	60	61	— 1½
28⅜	15½	17½	13½	(sh) 400,000	N.P.	Pan. American Western B	....	Jan. 30, 27	.....	.....	.....	.....	.....	.....
21¾	11½	15¼	3	(sh) 199,370	N.P.	Panhandle P. & R	.....	.....	1,500	5	5⅜	4⅞	5	— ⅜
106¼	70	76	47½	$2,935,200	$100	do pfd	.....	July 2, 23	200	50	50	50	50	— 2
53⅞	35¼	47	24¼	(sh) 2,406,803	N.P.	Phillips Petroleum	37½cQ	Oct. 1, 29	68,000	35⅝	39	35⅛	38	+ 2
5¼	½	3⅜	1	$29,622,925	$25	Pierce Oil Corp	....	.....	1,300	1⅜	1⅜	1¼	1¼	— ⅛
50	16¼	51½	20	15,000,000	100	do pfd	....	Feb. 1, 22	200	28½	28½	27	27	+ 1½
6⅝	3½	5⅞	½	(sh) 2,500,000	N.P.	Pierce Petroleum	.....	.....	1,800	2¾	2¾	2⅝	2⅝	— ⅛
64⅜	59½	65⅝	40½	$60,636,450	$25	Prairie Oil & Gas	‡50cQ	Sept. 30, 29	12,500	53	56¾	53	55¾	+ 3½
.....	....	65	45	101,250,000	25	Prairie Pipe Line	‡76cQ	Sept. 30, 29	6,300	58⅝	59	57⅞	58⅞	+ 1½
29⅞	16	25⅞	4	37,450,850	50	Producers & Refiners	....	Sept. 15, 23	2,800	9⅜	9¾	8⅞	9	+ ⅛
49⅝	41	46¾	25½	2,845,350	50	do pfd	.....	May 1, 25	640	32½	32½	32¼	32½	+ 1
31¼	19	30¾	20	75,959,255	25	Pure Oil Co	37½cQ	Sept. 1, 29	10,400	23⅞	23⅞	22¾	22⅞	— ⅞
119	108	116	108	13,000,000	100	do 8% pfd	$2Q	Oct. 1, 29	460	110¾	111	110½	111	+ 1
56	23½	49⅝	20	47,127,725	25	Richfield Oil	50cQ	Nov. 15, 29	6,600	29½	29½	28⅝	29	— ¼
.....	.....	42½	15	(sh) 1,200,000	N.P.	Rio Grande Oil Co	‡$1S.A.	July 25, 29	22,200	21⅛	21¼	19	19	— 1⅝
64	44⅝	64	43⅛	(sh) 546,646	$13.40	Royal Dutch N. Y. shares	$1.873	Aug. 10, 29	21,000	53	55⅜	52½	52½	— ⅜
57½	39⅜	55¾	43	(sh) 65,203,000	£2	Shell Transport & T	$1.447	July 23, 29	400	45¾	45¾	45½	45½	+ ¾
39⅜	23¼	31¾	19	12,254,979	N.P.	Shell Union Oil	35cQ	Sept. 30, 29	100	24	24¼	22⅞	24	0
27¼	18⅛	40⅛	15	$8,357,280	$10	Simms Petroleum	40cQ	Sept. 14, 29	3,400	23½	23½	22⅛	23⅛	0
46¾	17⅜	45	21	5,494,095	N.P.	Sinclair Consolidated	‡50cQ	Oct. 15, 29	63,900	27¾	27¾	26⅛	26¼	— 1⅝
110	102½	111	103	$16,025,200	$100	do pfd	$2Q	Nov. 15, 29	1,200	106½	107¾	106½	107¾	+ 2¾
42⅝	25	46½	28	27,396,590	25	Skelly Oil Co	50cQ	Sept. 16, 29	7,800	34	34	33	33⅞	— ¼
80	53	81⅞	51½	(sh) 13,016,435	N.P.	S. O. California	62½cQ	Sept. 16, 29	21,700	62¼	64	61	62	0
59¾	37¾	83	48	$612,095,850	$25	S. O. New Jersey	‡25cQ	Sept. 16, 29	96,700	65¼	65⅜	62½	64	— 1
45½	28¾	48⅛	31¾	434,094,575	25	S. O. New York	40cQ	Sept. 16, 29	15,000	35⅜	35⅞	35	35⅛	— ¾
77	31½	84¾	55½	(sh) 1,297,847	N.P.	Sun Oil	25cQ	Sept. 16, 29	1,100	62½	62½	56½	60	— 3½
110	110	105½	100	$5,000,000	$100	do pfd	$1.50Q	Dec. 2, 29	10	102⅞	102⅞	102⅞	102⅞	+ ¾
14¼	2½	24	5¼	(sh) 1,304,698	N.P.	Superior Oil Corp	....	Dec. 20, 20	9,600	8¾	8¾	7¾	8	— ½
74¾	50	71⅞	50	$211,082,925	$25	The Texas Corp	75cQ	Oct. 1, 29	20,300	56⅞	56⅞	54⅞	56	— ½
26⅜	12⅛	23⅞	9½	8,380,340	10	Texas Pacific Coal & Oil	2½⅝s	Sept. 30, 29	7,300	12	12¼	11½	11⅝	0
41½	19⅝	40	14	(sh) 2,179,275	N.P.	Tide Water Oil Co	20cQ	Sept. 30, 29	2,500	20	20⅛	20	20⅛	— 2
100⅞	86¾	97½	85⅛	$20,321,000	$100	do 5½% pfd	$1.25Q	Nov. 15, 29	200	...	88	87⅞	88	+ ¼
25	14¾	23½	10	(sh) 4,877,976	N.P.	Tide Water Associated	.....	Aug. 1, 27	13,900	14	14	13	13	— ⅛
91¾	81⅞	90⅞	74⅛	$72,989,200	$100	do pfd	$1.50Q	Oct. 1, 29	1,100	81⅞	82	81⅛	81½	+ ⅛
14½	6¾	15¼	5⅛	(sh) 3,842,029	N.P.	Transcontinental Oil	.....	.....	116,600	8⅝	9½	8⅜	9	+ ½
58	42¾	54½	42⅛	$40,858,375	$25	Union Oil of California	‡50cQ	Nov. 9, 29	6,200	46	46	44⅝	44¾	— 1¼
128⅛	110	163¾	121⅞	31,101,200	100	Union Tank Car Co	$1.25Q	Dec. 2, 29	.....	.....	.....	.....	.....	.....
44⅞	26	42⅞	15	(sh) 488,359	N.P.	Warner Quinlan	50cQ	Oct. 1, 29	10,000	22⅜	23¾	22¼	23½	+ ⅞
38	20⅛	38	25	(sh) 490,000	N.P.	White Eagle Oil & Refining	50cQ	Oct. 21, 29	600	28	29	28	28¼	— 1¾
22⅛	17¼	29¾	12⅞	(sh) 428,967	N.P.	Wilcox Oil & Gas	....	May 10, 28	500	15	15½	15	15½	+ ¼

*New High †New Low xEx-Dividends ‡Also Extras s-Stock Total Sales 770,140

Pittsburgh Stock Exchange

Transactions Week Ended Nov. 27, 1929

	Sales	High	Low	Last	Change
Ark. Nat. Gas	875	12⅜	11	11	—2
do pfd	1,024	7¾	7½	7¾	0
Devonian Oil	369	11	10¼	10¼	— ¼
Dixie Gas & Util pfd	10	72	72	72	— ¾
Lone Star Gas	5,877	35¼	33	33½	—1½
Plymouth Oil	700	29½	28½	28½	—1½
Pgh. Oil & Gas	520	3¼	3¼	3¼	0
Salt Creek Cons	20	2½	2½	2½	0
Shamrock Oil & Gas	1,470	16	16	16	0
Wiser Oil	45	18	18	18	— ½

Pittsburgh Curb Market

Transactions Week Ended Nov. 27, 1929

	Sales	High	Low	Last	Change
Ark. Gas "A"	1,800	11⅝	10½	10½	0
Lone Star pfd	780	102½	101½	102½	0

WASHINGTON—Both imports and exports of oil were larger for the Netherland West Indies during 1928 than during 1927. Imports of crude in 1928 totaled 70,943,096, compared with imports of 30,656,650 barrels in 1927.

Tank Wagon Tables

(*Continued from Page 141*)

	Gasoline Total T.W. Tax	Oil T.W.	Oil S.S.	Oil T.W.
MANITOBA				
Winnipeg	21.5 3	24.5	28	21.5
SASKATCHEWAN				
Regina	26 3	29	33	26
ALBERTA				
Edmonton	27.5 5	32.5	36	27.5
Calgary	23.5 5	28.5	32	23.5
BRITISH COLUMBIA				
Vancouver	23 3	26	30	24
QUEBEC				
Montreal	20.5 5	25.5	29	21.5
Quebec City	21.5 5	26.5	30	22.5
Three Rivers	21.5 5	26.5	30	22.5
NEW BRUNSWICK				
St. John	22 5	27	31	24
Moncton	22 5	27	31	24
NOVA SCOTIA				
Halifax	22 5	27	31	24
Sydney	22 5	27	31	24
PRINCE EDWARD ISLAND				
Charlottetown	22 5	27	31	24

Note: In districts surrounding these points 1c additional is added to city price.

Oil Dividends

Amount	Payable	Stock of Record
Anglo-American interim	7½%	Nov. 27	.....
Andian National initial	$1	Dec. 16	Dec. 2
Associated Oil q	50c	Dec. 31	Dec. 9
Honolulu Cons. Oil q	50c	Dec. 16	Dec. 10
do extra	50c	Dec. 16	Dec. 10
International Pet	25c	Dec. 16	Dec. 7
Oil Shares q	37½c	Dec. 20	Dec. 10
Pure Oil 8% pfd. q	$2	Jan. 2	Dec. 10
do 6% pfd. q	$1.50	Jan. 2	Dec. 10
do 5¼% pfd. q	$1.25	Jan. 2	Dec. 10
Phillips Petroleum q	50c	Jan. 2	Dec. 16
do stock	5%	Jan. 2	Dec. 16
S. O. Kentucky q	40c	Dec. 31	Dec. 16
do extra	40c	Dec. 31	Dec. 16
S. O. Ohio q	62½c	Jan. 2	Dec. 6
Tide Water Oil q	20c	Dec. 31	Dec. 9
Tide Water Associated pfd. q	$1.50	Jan. 2	Dec. 9
Warner Quinlan q	50c	Jan. 2	Dec. 12
Wellington Oil q	5c	Dec. 16	Nov. 30
do extra	5c	Dec. 16	Nov. 30

Basketball Team for Ohio Jobber

CLEVELAND, Dec. 2.—A basketball team has been organized by the Columbia Refining Co. here. The team will be composed of ex-stars of leading universities and it will be entered in the Class "A" group. The team will be known as "Pennzoil."

Financial Notes

Pan American Petroleum & Transport Co.—Call has been issued for redemption of $339,000 principal amount of 7 per cent marine equipment bonds. The call price is $105. The bonds mature Aug. 1, 1930.

Cities Service Co.—Earnings in year ended Oct. 31 amounted to $33,727,846 before reserves as compared with $29,296,972 in the preceding year. Nov. 15 the company had 323,727 stockholders, a gain of 55,493 in the preceding month.

Standard Oil Co.. of Indiana—Offer for exchange of Standard's stock for that of Pan American Petroleum & Transport Co. expired Nov. 30. The Standard is understood to have acquired ownership or control of approximately 70 per cent of the Pan American stock.

Simms Petroleum Co.—Remaining $267,500 of 6 per cent convertible notes which were outstanding Nov. 15 have been retired, this company has announced. The original issue was $3,341,500. The company now has no issues senior to its common stock.

Royal Dutch Co.—Stockholders in special meeting at Amsterdam have approved an increase in the capital stock from 600,000,000 to 1,000,000,000 florins. The additional stock is to be issued whenever desired. Stockholders also authorized bonds for issuance whenever desired but with the provision that bond issues shall never exceed more than one-half the outstanding capital stock without approval of stockholders.

Southern to Sell More Of Pipe Line System

CLEVELAND, Nov. 30.—Southern Pipe Line Co. has agreed to sell to the Manufacturers' Light & Heat Co. one of its remaining pipe line systems to the east for $506,391. Stockholders are being asked to approve the sale at the time of the annual meeting of Southern.

If the sale is authorized a special stock reduction dividend of about $5 a share is to be paid. Forrest M. Towl, president, has notified stockholders.

The sale, Mr. Towl said, will not be closed until about next May 1 in order to remove oil from the line. The company's remaining system has twice the capacity needed to handle all oil that is being tendered for transit.

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Standard Oil Stocks on New York Curb

1928 High	1928 Low	1929 High	1929 Low	Outstanding Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Nov. 30 Sales	First	High	Low	Last	Change
22⅜	14⅞	18¾	14¼	£4,126,460	£ 1	Anglo-American Oil	36c	June 5, 29	.....	....	....	....	....	.....
21¼	15	18	13	.....	....	do certificates	36c	June 5, 29	82,300	16½	17⅛	16½	17	0
20½	14⅜	17	11	.....	£ 1	do ctfs. non-voting	36c	June 5, 29	66,100	16¼	17	16	16⅞	+ 1½
5	1¼	2½	.75	(sh) 500,000	N.P.	Atlantic Lobos	.....	.....	200	⅞	⅞	¾	¾	— ¼
9¾	3¼	4⅛	1	$10,000,000	$50	do pfd	.....	.....	200	1¼	1¼	1¼	1¼	0
56	44½	46½	25	$1,000,000	25	Borne-Scrymser	$1 S.A.	Oct. 15, 29	150	25¼	27¾	25¼	27¾	+ 2¾
76	58	74¼	55	10,000,000	50	Buckeye Pipe Line	‡$1Q	Sept. 14, 29	2,400	61⅞	68¼	61⅞	68¼	+ 8¼
161	117¼	210	130	3,000,000	25	Chesebrough Mfg	‡$1Q	Sept. 30, 29	100	144¾	144¾	144¾	144¾	+ 4½
23	16	29	8⅛	36,123,350	10	Continental Oil	.....	Dec. 15, 27	1,100	15½	15⅝	15	15	— ½
17½	9½	11¾	5⅝	.....	N.P.	Creole Petroleum	.....	.....	8,400	6⅞	7	6⅝	6¾	— ½
82	67	95	40	1,500,000	50	Cumberland Pipe Line	$1Q	Sept. 16, 29	200	43	43	43	43	+ 3
88	64⅜	70½	42	5,000,000	100	Eureka Pipe Line	$1Q	Nov. 1, 29	50	42	43	42	43	+ 1
13	4¼	7	5	16,000,000	100	Galena Signal Oil	.....	June 30, 25	.....	....	....	....	....	.....
86	26	90	73½	4,000,000	100	do new pfd	.....	June 30, 26	.....	....	....	....	....	.....
89¾	35	88	73½	2,000,000	100	do old pfd	.....	June 30, 26	.....	....	....	....	....	.....
114¾	59¼	128	74⅛	73,685,700	25	Humble Oil & Refining	‡30cQ	Oct. 1, 29	6,100	90⅛	90½	89⅝	89	— 1⅛
290½	176½	340½	260	20,000,000	100	Illinois Pipe Line	$10S.A.	June 15, 29	2,800	265	310	265	310	+45
104	56¾	41	22	(sh) 26,421,768	N.P.	Imperial of Canada	12½cQ	Dec. 2, 29	4,000	27½	28	27¼	27⅞	— ¾
91⅞	74⅝	34⅞	26	$1,000,000	$10	Indiana Pipe Line	‡50cQ	Nov. 15, 29	3,800	31⅞	42⅛	31⅞	39¼	+ 8½
55	35	29⅜	15	(sh) 14,247,088	N.P.	International Petroleum	12½c	June 25, 29	7,800	21⅞	22⅛	21¾	22	0
32⅜	19⅜	25⅞	10½	$6,363,350	12.50	National Transit Co	25cQ	Sept. 16, 29	8,200	21¾	22⅛	20⅝	22⅛	+ 1⅛
75	38½	85	72	1,000,000	10	New York Transit	40c	Oct. 15, 29	.....	....	....	....	....	.....
69	56½	63	41	2,000,000	50	Northern Pipe Line	$2 S.A.	July 1, 29	.....	....	....	....	....	.....
83½	58½	79⅞	64⅛	60,000,000	25	Ohio Oil Co	50cQ	Sept. 14, 29	1,700	68¾	71	68¼	71	+ 2¼
84	28	44½	20	10,000,000	25	Penn Mex. Fuel	$1	Sept. 30, 29	800	20	20	20	20	0
220	167	50	33	4,000,000	25	Solar Refining	$1.25S.A.	June 20, 29	300	34⅓	36½	33	36½	+ 2⅝
19	12	23½	13	1,000,000	10	Southern Pipe Line	$1	Mar. 1, 29	400	22¾	23½	23	23½	+ ¼
71⅞	36¾	60¼	35⅛	30,000,000	25	South Penn Oil	50cQ	Sept. 30, 29	1,600	42	42	41½	41⅞	— ⅛
102	70	70	45	1,750,000	50	South West Pa. Pipe Lines	$1	Oct. 1, 29	50	50¼	50¼	50¼	50¼	+ ½
95⅞	70⅞	63	45	348,175,069	25	S. O. Indiana	62½cQ	Sept. 16, 29	34,700	54	54⅜	53	53⅜	— ½
27¾	15	33¾	18	8,000,000	25	S. O. Kansas	.....	June 16, 24	1,600	30½	30½	27½	27½	— 2½
49	44	46⅜	29	25,654,516	10	S. O. Kentucky	40cQ	Sept. 30, 29	6,700	37½	38	35⅝	36	+ ½
54⅝	39⅞	50¾	40	4,649,225	25	S. O. Nebraska	‡62½cQ	Sept. 20, 29	.....	....	....	....	....	.....
134	71	129	60	14,000,000	25	S. O. Ohio	62½cQ	Oct. 1, 29	250	87½	87½	87½	87½	+ 1½
125	116	124½	113½	7,000,000	100	do pfd	$1.75Q	Dec. 2, 29	.....	....	....	....	....	.....
23½	16	18	10	861,466	25	Swan Finch	30c	Jan. 15, 29	100	10	10	10	10	0
111	72	133¾	75	126,154,000	25	Vacuum Oil	$1Q	Sept. 20, 29	4,700	97	97¾	94¾	94¾	— 1

*New High †New Low ‡Also Extras

Independent Oils on New York Curb

1928 High	1928 Low	1929 High	1929 Low	Par Value	Stocks	Transactions Week Ended Nov. 30 Sales	First	High	Low	Last	Change
1½	.53	.72	.125	$5	Amer. Cons. Oilfields	1,800	1/16	1/16	1/16	1/16	— 1/16
9½	3¼	8¾	1¼	N.P.	Amer. Maracaibo	2,900	2	2	1¾	1¾	— ¼
4½	2¼	4¾	1⅛	$10	Argo Oil	100	1⅜	1⅜	1⅜	1⅜	+ ⅛
3¾	3⅜	26	3¾	N.P.	Arkansas Nat. Gas	8,400	11⅞	11½	10⅞	11⅞	— ¾
....	....	24¾	6½	N.P.	do A	19,600	11½	11½	10¼	10½	— 1⅛
....	....	9	4	10	do pfd	500	7¾	7¾	7¾	7¾	+ ¼
55	32¾	70	50	N.P.	British American Oil	.....	....	....	....	....	.....
23⅞	3¾	4⅞	1	25c	Carib Syndicate	8,600	1⅛	1¼	1	1⅛	— ⅛
....	....	68⅛	20	N.P.	Cities Service new	142,100	30⅛	30⅜	27	29	— 1½
103½	94½	99¼	84	100	do pfd	2,000	89½	90	89	90	+ ¼
9⅜	8⅞	9¼	8	10	do pref. B	.....	....	....	....	....	.....
97	88½	96	88	100	do pref. BB	.....	....	....	....	....	.....
2¼	1	1½	⅜	1	Colombia Syndicate	13,100	⅜	7/16	⅜	⅜	— 1/16
17¾	9¾	15	3⅞	N.P.	Colon Oil	.....	....	....	....	....	.....
8⅞	6¼	11⅛	2½	10	Consolidated Royal	200	4½	4½	4½	4½	0
....	....	135	42	N.P.	Cosden Oil Co	1,100	75	75	75	75	— 5
....	....	82	55	....	do pfd	200	60¼	60¼	60¼	60¼	+ 4¼
3¼	.76	2½	⅝	N.P.	Crown Central	700	¾	¾	¾	¾	0
15	6¾	11⅞	4	N.P.	Crystal Oil	.....	....	....	....	....	.....
50	48	51⅛	51⅛	$100	do pfd	.....	....	....	....	....	.....
33½	8⅛	26	6½	N.P.	Darby Petroleum	2,800	9	9	9	9	+ ⅛
2⅞	1	11	2	N.P.	Derby Oil & Refining	2,100	5⅜	5⅝	5⅛	5¼	— ¾
21⅛	7½	44	5	N.P.	do pfd	.....	....	....	....	....	.....
165	101⅛	209	115	$25	Gulf Oil Corp	3,400	134	138	132½	132½	— 3½
7½	5⅜	7½	1⅛	5	Homaokla Oil	200	3⅞	4	3⅝	4	+ ½
....	....	49¼	5	$1	Indian Territory	2,100	18½	19⅛	18½	18½	0
3⅜	1	2⅞	⅜	10	Intercontinental Pet	1,900	¾	⅞	⅝	⅞	0
3	¼	3⅜	1¼	N.P.	Kirby Petroleum	.....	....	....	....	....	.....
9⅜	5⅛	6⅛	2	N.P.	Leonard Oil & Dev	1,800	2⅜	2⅜	2	2	— ⅛
43⅜	20	38⅞	18	N.P.	Lion Oil & Refg	800	23	23	23	23	+ 1
....	....	67⅞	28	N.P.	Lone Star Gas	1,800	34⅛	34⅛	33¾	33¾	— 1
1⅞	.50	1¼	¼	1	Magdalena Syndicate	600	¼	¼	¼	¼	— 1/16
48½	32	38½	15	N.P.	Margay Oil	.....	....	....	....	....	.....
8	2¾	6⅜	2½	N.P.	Mexico-Ohio Oil	1,100	3	3⅛	3	3⅛	+ ⅛
....	....	42	8	N.P.	Missouri-Kan. P. L	1,800	16⅞	16⅞	16½	16¾	— 1⅛
1¾	.76	1½	¼	1	Mountain & Gulf	800	⅝	⅝	⅝	⅝	— ⅛
28⅞	19½	22⅞	7	10	Mountain Producers	1,800	10	10	9½	10	+ ⅛
....	....	43⅞	24	N.P.	Nat. Fuel Gas (new)	1,900	28½	30	26⅝	27	— 1½
5⅝	4¼	5	2¼	5	New Bradford	2,500	3	3½	3	3⅜	+ ⅜
5½	3	3⅞	2¾	10	New England Fuel	500	3	3	3	3	0
11⅞	7⅛	9⅜	2¼	1	New Mex. & Ariz	1,000	3½	3½	3	3	— ½
15½	11⅜	24½	11⅜	25	New York Petrol	2,000	13¼	14⅞	13	14⅞	+ 2⅜
13¼	8⅛	18½	6⅛	N.P.	North Cent. Texas	2,000	7¼	7¼	7⅛	7¼	— ¼
....	....	19¼	8⅛	N.P.	Oil Stock, Ltd. A	800	10¼	10½	10⅛	10½	+ ½
....	....	18¼	10	N.P.	do B	.....	....	....	....	....	.....
26¼	20	26⅝	12⅝	N.P.	Pacific Western Oil	900	15½	15½	14¾	15	— ⅝
6	2¼	3½	½	N.P.	Pandem Oil	1,500	¾	¾	11/16	11/16	+ 1/16
15⅝	8½	10½	2⅜	N.P.	Pantepec Oil	4,800	4	4	3½	3⅝	— ⅜
20	10⅜	25½	22½	$25	Paragon Refg. B. ctfs.	.....	....	....	....	....	.....
....	....	34½	17	N.P.	Petroleum Corp	19,600	21¼	21½	20¼	21	— ¼
31⅜	26½	37	22	N.P.	Plymouth Oil	100	28½	28½	28½	28½	— 1½
18	8	16	9⅜	25	Red Bank Oil	200	9⅜	9⅜	9⅜	9⅜	0
13	4⅛	8½	1⅛	N.P.	Reiter-Foster	500	3	3⅛	3	3	— ⅛
31½	23¼	25½	19	$25	Richfield pfd	.....	....	....	....	....	.....
....	....	29	17	....	Root Refining pfd	200	19¾	19¾	19¾	19¾	— ¼
12	4⅜	11	3	N.P.	Ryan Consolidated	400	3¾	4⅛	3¾	4⅛	— ½
7¼	5½	5⅞	1⅞	$10	Salt Creek Cons	700	2	2	2	2	0
35	23¼	25⅞	9	10	Salt Creek Prod	1,500	12¾	12⅞	11½	11¾	+ ⅛
3½	1	2½	½	5	Savoy Oil	1,100	1/16	1⅜	1/16	1⅜	0
40	27	33⅛	32	25	Shreveport El Dorado	.....	....	....	....	....	.....
....	....	24	11⅜	N.P.	Southland Royalty	2,400	12	13¼	12	13¼	+ 1¼
....	....	12	4	N.P.	Sunray Oil	1,600	8⅝	8¾	8	8⅝	+ ⅜
....	....	23	7⅛	N.P.	Texon Oil & Land new	500	10½	10½	9¾	10	— ½
22⅞	13	16⅞	11⅝	$10	Tidal Osage	.....	....	....	....	....	.....
21¼	13⅜	16½	10⅜	10	do not-voting	.....	....	....	....	....	.....
93¾	75	155	80	100	Transcontinental pfd	.....	....	....	....	....	.....
74¼	18	81⅛	66	10	Venezuela-Mexico	200	77½	77½	77½	77½	0
9⅜	4¾	6½	1⅛	3	Venezuelan Petrol	2,800	2½	2½	2⅛	2⅜	0
....	....	72¼	66	N.P.	White Star Oil	.....	....	....	....	....	.....
8¼	4⅞	9⅛	2	1	Woodley Petroleum	3,300	3¾	3¾	3½	3½	— ⅛
⅜	⅛	5⅜	½	25	Y Oil & Gas	1,900	¾	⅞	⅝	⅞	— ¼

*New High †New Low

New York Curb Bonds

Week Ending Nov. 29

	High	Low	Last	Change
Beacon Oil 6s '36	105	105	105	— ⅛
Cities Service 5s '66	84⅞	82	83¼	— ⅝
Cities Service G. 5½s '42	85¾	85	85½	+1
Cities Service 6s '43	92	91¾	91¾	+1
Cont. Oil 5½s '37	93	92½	93	+1
Empire O & R 5½s '42	85½	83¾	85	+ ¼
Gulf Oil 5s '37	99⅞	99	99¾	+ ⅜
Gulf Oil 5s '47	101	100⅝	101	+ ½
Independent Oil 6s '39	102⅞	101⅛	102⅛	+ ⅜
Shell Union Oil 5s '19	99⅜	97⅝	98⅜	+ ¾
Sun Oil 5½s '29	99½	99⅛	99½	....
Valvoline Oil 7s '37	104	104	104	+1

New York Bonds

Week Ending Nov. 29

	High	Low	Last	Change
Asso. Oil Gold 6s	101¾	101½	101½	0
Atlantic Refg. deb. 5s	102½	101⅛	102½	+1
Cal. Pet. 5s	95	93	94	+1
Cal. Pet. 5½s	98¾	98⅛	98⅛	— ½
General Pet. 5s	100	100	100	— ½
Humble Oil & Refg. 5s	100¼	99¾	100	0
Humble Oil & Refg. 5½s	101	100⅜	100¾	+ ⅜
Pan. Amer. P. & T. 7s	104½	104½	104½	— ⅛
Pan. Amer. P. & T. 6s	104	102½	103⅜	— ⅛
Pan. Amer. P. & T. 6s	95	94½	95	— ½
Phillips Pet. 5½s	92½	90½	91⅞	+1⅛
Pierce Oil deb. 8s	103	103	103	0
Pure Oil 5½s	99¼	97⅞	99	+1
Richfield Oil Calif. 6s	98½	97½	98⅛	+ ½
Shell Union Oil 5s	95	94	94½	+1
Sinclair Con. Oil 7s	101⅜	100½	101⅜	+ ⅛
Sinclair Con. Oil 6½s	99	98	99	+ ¾
Sinclair Con. Oil 6s D	100	99	100	+ ⅛
Sinclair Con. Crude 5½s	97	95¾	96¼	+ ⅝
Sinclair Pipeline	95	94	94½	+ ½
Skelly Oil 5½s	92	90	91⅞	+1⅞
S. O. N. J. 5½s	102	101½	102	0
S. O. N. Y. 4½s	96	95	96	0
Union Oil of Calif. 6s A	106⅛	106	106⅛	+1⅛
Union Oil of Calif. 5s C	97⅝	97⅜	97½	+ ½
Warner-Quinlan 6s	89	89	89	+2
White Eagle Oil 5½s	98¾	96⅝	98¾	+2⅛

Cleveland Stock Market

Nov. 29	Par Value	Bid	Asked
Canfield Oil Co	$100	100	146
do pfd	100	102	...
Fred G. Clark Inc	10	...	...
National Refining Co	25	34	35
do pfd	100	...	135
Paragon Refining Co	25	9½	11
do pfd	N.P.	31	41
do ctfs	...	9¾	10½